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STEEL

The Magazine of Metalworking and Metalproducing

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YOU CAN RELY ON

INLAND

OR THE RIGHT STEEL

• • •

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CHICAGO

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Higher working pressure — Making a new hose that's 50% lighter, more flexible and oilproof didn't cut down on the pressure it could handle. In fact, Highflex stands higher pressures than heavy, old type hose the same size.

B. F. Goodrich makes an air hose for every purpose, from small air tools to big construction machinery. If you use air pressure in your business, your local BFG distributor can give you the latest data on the improvements in B. F. Goodrich air hose . . . improvements that may save you money, increase production. Give him a call, or write *The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.*

Air Hose BY

B.F. Goodrich

STAINLESS STEEL

FIRST OF A SERIES OF REPORTS ON THE "MAGIC METAL"

INTRODUCTION

The skyrocketing popularity of stainless steel has created a situation that classes all heat and rust resistant steels as stainless, and explains the entire category simply by saying, in effect, it's stainless because it's stainless, and it won't rust, corrode or disintegrate. This column will attempt to describe the important aspects of stainless, and, in the months that follow, explain the different types and tell just why it is stainless and won't rust, corrode or disintegrate.

There are many distinct advantages to be had through the use of stainless steel. The natural luster of stainless, plus the many finishes available means added product beauty. Stainless steel is considerably stronger than ordinary steels which means products can be made of lighter gauges. Stainless resists corrosion and abrasion which practically eliminates fatigue. And because stainless is strong, yet ductile, it permits tightening of production lines which leads to reduced costs and higher qualities.

FOUR MAIN CLASSIFICATIONS

There are four main classifications of stainless steel. They are: 1. those that contain chromium as the principal alloying element, 2. those that contain chromium as the principal element together with a second element in sufficient amounts to modify the properties of the straight chromium type, 3. those that contain both chromium and nickel as principal alloying elements, and 4. those that contain chromium and nickel as the principal elements together with a third element in amounts sufficient to alter the properties of the chromium-nickel.

It is seen that chromium is the common element in all four basic types. It is mainly the chromium that gives to stainless the outstanding ability to form a tightly adherent transparent oxide film over the surface of the steel. Theorists say when this film is broken—if oxygen is present—it will reform instantly—thereby retarding oxidization and maintaining its important protective function.

Straight chromium grades are the least expensive types of stainless because of the absence of costly nickel. They are generally tougher, more abrasion resistant and certain types hold an edge better than do the chromium-nickel grades. They are magnetic and both hardenable and non-hardening.

Chromium-nickel grades have more flexibility of application. They are more ductile and more easily worked. They are nonmagnetic and non hardenable except by cold working. They have a higher resistance to corrosion than do the straight chromium grades and offer better weld characteristics.

Third elements that further alter the properties of stainless steels include aluminum, copper, cobalt, tungsten, columbian, lead, molybdenum, selenium, titanium, and vanadium. These elements will be discussed in a later column.

RUST RESISTANT THROUGHOUT

Because the chromium and/or nickel become a part of the alloy the corrosion resistance of the material is not confined to local portions, but extends throughout the entire metal. Thus stainless steels do not have to depend on mechanically or chemically applied protective surface deposits.

The four basic types of stainless are, of course, further modified by altering the basic ingredients carbon, nickel and chromium. Generally 11 percent chromium is sufficient to counteract mildly corrosive influences such as nitric or citric acids or ordinary atmospheric corrosion. To maintain immunity against the more severe or intensive corrosives such as chlorides, bromides, etc., and to resist oxidization at elevated temperatures a greater percentage of chromium and/or nickel must be added. It is this great versatility of stainless steel that makes it important that the end use of the product be thoroughly considered in order to procure the exact type of stainless steel required to do the job.

(This is one of a series of reports on stainless steels that will appear monthly in this column through the courtesy of the **Sharon Steel Corporation.** NEXT: Straight Chrome Grades.)

Advertisement

Behind the Scenes . . .

A Man Behind the Scenes

Each week the editors take you on a fast tour of foreign metalworking industries. In this issue the trip begins on page 58. One of the guides most weeks is Jacques Foulon of Liege, Belgium.

Born in 1925, he's the youngest of STEEL'S staff members and correspondents. In 1943 he completed studies at what corresponds to an American high school, the Royal Atheneum in Liege. The war interrupted his formal education for a year, but he entered the University of Liege in 1945 and obtained a degree in metallurgical engineering in 1949. He worked part time in industry and went to college for several years. Now at 25, he is correspondent for STEEL, works manager of Foulon Foundry, technical director of Foundry Equipment Co. and general secretary of the Foundry Technical Association of Belgium.

Mr. Foulon is married and has two baby daughters.

The Older the Better

Has your company had a birthday recently? We've just heard of someone that makes a business of industrial anniversaries. Dennison Mfg. Co., Framingham, Mass., helps companies promote their age.

We mention this because we have been struck by the foresight of the many metalworking firms who got themselves founded in some easy-to-remember year that goes well with 1950—1850 to 1950, 1875 to 1950, 1900 to 1950. That all looks well on the letterhead.

STEEL missed the boat in this matter, we're sorry to say. We were established in 1882.

It's Only Money

Associate Editor Vance Bell is now knee-deep in company annual reports and calculating machine tape, but he will have everything tabulated in time to bring you our 25th annual financial report of the steel industry Apr. 24.

Next week's summary will give you information obtainable nowhere else—far more than just the data found in steel companies' annual reports. Producers turning out more than 90 per cent of all the steel made in this country will be represented.

Production Pointers

The editors upstairs aren't the only ones who are giving you production pointers each week. The advertisers are doing a dandy job, too. Gisholt Machine Co., for example, in this issue beginning on page 17, has four pages of valuable production ideas.

Speaking of four-page ads, we hear that Russell, Burdsall & Ward Bolt & Nut Co. has an idea-filled spread coming up next week, Apr. 24.

Puzzle Corner

Here's the answer to the magic squares puzzle of Apr. 3

17	24	1	8	15
23	5	7	14	16
4	6	13	20	22
10	12	19	21	3
11	18	25	2	9

Those who submitted correct answers include E. Buschow of Surface Combustion Corp., J. Stanitz of Mullins Mfg. Corp., Theodora Morgan of William Esty Co., M. C. Parchi of Niagara Falls, N. Y., and C. E. Norton of Highland Park, Ill.

R. B. Bagby of Bagby & Co. submits this one:

Al and Bill are high school juniors who work part time for the chief inspector of a machine shop. One day each was given a group of acorn nuts to inspect, with appropriate gages. They played a little, as boys will. Each arranged the rejected nuts of his group in a straight line and put the good ones in parallel lines to the first, with all spaced the same right to left and up and down. When they finished playing and inspecting, each found that his group of nuts formed a perfect square. When the chief inspector asked how many nuts each had rejected, they handed him this slip:

$$A + B^2 = 213$$
$$A^2 + B = 303$$

How many rejected nuts had each found?

Shrdlu

(Editorial Index—page 39)

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STEEL

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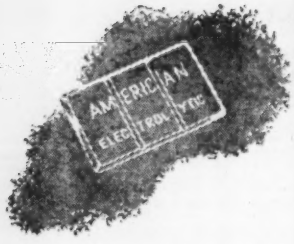

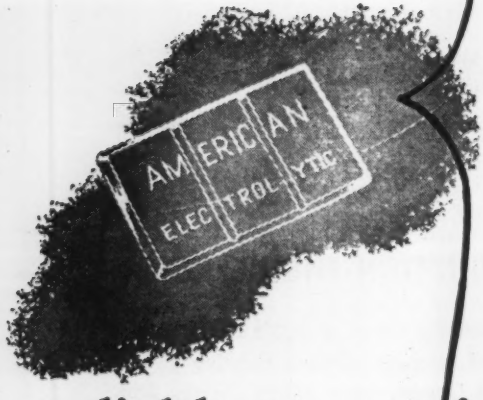

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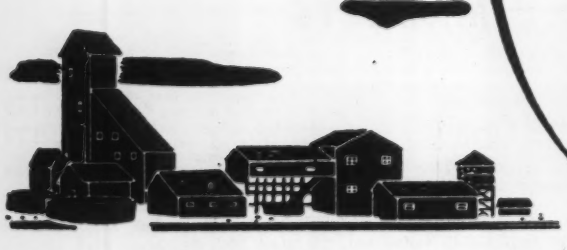

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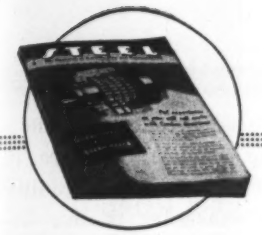

April 17, 1950

You Don't Have To Be Big

In many respects the 1950 convention and exposition held in Philadelphia last week by the American Society of Tool Engineers was one of the most satisfactory events of its kind in the long history of American industrial joint meetings and shows.

Usually an affair of this kind is judged to be a success if it meets certain traditional yardsticks such as attendance, excellence of program and exhibits, and favorable reception on the part of those who attend it. Last week's convention and show of the tool engineers passed all of these conventional tests with flying colors. It was in other less orthodox respects that it won its chief claims to unusual success.

One of these was the almost universal appeal of its principal theme. The 1950 convention and show had been promoted as a "cost-cutting exposition." It more than lived up to the implications of this timely title. This fact was demonstrated time and time again by visitors who boasted that they had picked up valuable ideas which could be translated into cost savings when they returned to their plants. One first-time exhibitor confessed ruefully that he was sadly neglecting his own exhibit because he was so busy discovering cost-cutting ideas in the booths of his fellow exhibitors.

But the most distinctive characteristic of the tool show was the degree to which it was symbolic of the American system of manufacturing. At Philadelphia no two, three or four mammoth exhibits dominated the show. Companies of large, medium and small size had exhibits that did not vary greatly as to size. In this show, one sensed the important fact that a small specialty manufacturer may count among his valued customers some of the industrial giants of the nation. The show was a constant reminder that one doesn't have to be a big outfit to do profitable business in the American system of manufacturing.

It is too bad that our representatives in Washington could not have been present to feel at first hand the tremendous importance of the relatively small tool, die and allied companies to the present industrial strength of the nation. Could they sense this importance, the government attitude toward business would undergo a marked change.

* * *

WORLD'S ORE RESERVES: A highlight of the blast furnace, coke oven and raw materials conference held in Cincinnati last week was an analysis of the world's iron ore resources by John W. Gruner of the University of Minnesota.

Mr. Gruner's studies show the United States has access to a primary iron ore reserve of 8096 million gross tons. Russia can command resources of 6060 million tons. Neither figure includes low-grade magnetic ore such as taconite which must be upgraded from 25 per cent iron content.

Mr. Gruner believes that these reserves credited to either country cannot last even a century if consumption follows the growth now predicted by economists. Another war would exhaust the supplies even more rapidly. As present ores are depleted, the two nations will be forced to depend more and more upon three expedients: 1. Mine small new domestic deposits certain to be discovered. 2. Beneficiate more

(OVER)

low-grade domestic ores. 3. Begin to tap rich deposits, such as exist in Brazil, India and elsewhere, that cannot be mined economically now because of distance.

Encouraging was Mr. Gruner's estimate of the possible output of ore over the next few decades from the Lake Superior, Adirondack, Alabama and other sources in the United States and Canada. The proved reserves afford time in which to prepare for the alternatives but not enough time to permit of procrastination.—p. 47

* * *

CONSTRUCTION BOOMING: Additional tangible evidence of the current rapid pace of construction is provided by the latest monthly tabulation by F. W. Dodge Corp. Construction volume in March in 37 states east of the Rocky mountains was $1,300,201,000. This is an alltime high, topping the former record of $1,190,264,000 in June, 1942, by a comfortable margin.

Another record was broken for first quarter dollar and physical volume. Dollar volume of construction for the first quarter of 1950 exceeded that of the first quarter of 1949 by 56 per cent. The gain in residential construction was more than 100 per cent, in nonresidential construction 30 per cent and in heavy engineering 25 per cent.

This record building activity should be good news to many companies in the metalworking industries. Aside from their products going into actual construction are the furnishings, equipment and appliances which to an increasing extent provide a sizable recurrent market for materials, parts and components. —p. 64

* * *

MAKING SEMIFINISHED: Twenty-fourth in this publication's series of articles on fundamentals of steelmaking is a treatise on the production of semifinished steel by Karl L. Fetters and H. H. Hottel of Youngstown Sheet & Tube Co. Part II of this treatise, which appears in this issue, deals with problems involved in the heating of ingots in soaking pits and also with an introduction to the operation of blooming mills.

The authors devote considerable attention to factors involved in transit time—the interval from the time ingots are poured until they are placed in soaking pits. The variations between the ideal transit time and that sometimes necessitated by breakdowns, roll changes and other contingencies introduce problems which the authors discuss in language easily understandable by laymen. These articles provide a realistic understanding of modern practice in the production of semifinished steel, the quality of which determines the character of our finished steel products. —p. 86

* * *

ZINC FOR DIE CASTING: A feature of the 32nd annual meeting of the American Zinc Institute in St. Louis last week was an analysis of the growth of the zinc die casting industry by R. G. Kenly of New Jersey Zinc Sales Co.

Consumption of zinc for all purposes has remained rather steady at about 11½ pounds per capita annually for the past decade. Compared with this static overall consumption of zinc, sales of zinc die castings have grown from one-quarter pound per capita in 1926 to 1.2 pounds in 1936 and 2.75 pounds in 1949. This growth has advanced die castings to second place in the utilization of zinc, galvanizing still holding first position.

Contributing to the rise in the consumption of zinc die castings has been a marked improvement in quality, due in large part to the application of a better knowledge of metallurgy to the development of the proper zinc alloys. —p.50

* * *

HOW STEEL IS SHIPPED: Behind arguments of Eastern rail carriers for a 25 per cent reduction in freight rates on 80,000-pound carload shipments of iron and steel products is testimony showing the extent to which the haulage of some steel items has been lost to trucks.

The rail carriers' petition to Interstate Commerce Commission contains information derived from a survey conducted in a single week in December, 1949, which shows that 52.2 per cent of all steel moved in that period was carried by highway truckers. In that week trucks moved 72.5 per cent of sheet and strip tonnage, 58.9 per cent of tin and terne plate, 53.1 per cent of bars and 50.5 per cent of wire and wire products. The railroads moved 92.4 per cent of shapes and piling; 87.5 per cent of pipe, tubes and fittings; and 77.6 per cent of plates.

The wide divergence in percentage indicates that in addition to freight rates, other factors are involved, such as dimensions, urgency of need, trade practices, etc. —p. 53

E. L. Shaner

EDITOR-IN-CHIEF

News Summary

IRON ORE—We have an iron ore problem, but it's solvable because the United States has access to known ore reserves here, in Canada, South America and Africa that can last nearly a century (p. 47). The problem is to get the good ore and to beneficiate the poorer grades available. Russia, too, has enough ore and the same transportation and concentrating problems we face. Richest known ore deposit in the world is probably in India.

BUSINESS WEATHER—Look for new sales highs in metalworking for the short term at least (pp. 64-67). The Federal Reserve Board says consumers are in a buying mood. Business inventories are falling. For the second consecutive week, STEEL's industrial production index stayed at 193 per cent of 1936-1939 average, an alltime high. High steel ingot production in the first quarter (p. 52) and continuing near-capacity rates of operation support forecasters' predictions for a good metalworking first half.

ECONOMIC FORUM—"Business looks good, but . . . ." That's the consensus of four experts who spoke at an economic forum at the American Society of Tool Engineers' show (p. 49). Dr. Edwin G. Nourse thinks the U. S. is not facing economic realities. Other speakers say economic prospects are excellent, but they are concerned about rising fixed costs, unionism's effects on productivity and the international political situation.

NASH RAMBLER— Nash expects big things from its new low priced Rambler, on which production is getting under way (p. 61). A convertible model will seat five and will get 30 or more miles to a gallon of gas.

ZINC DIE CASTINGS—You're using 11 times as much die cast zinc now as in 1926 (p. 50). You're consuming a total of 200,000 tons of zinc a year. Galvanizers still take the most zinc, but producers of die castings are on their heels.

NLRR REORGANIZATION—Write your Congressman to vote against President Truman's Reorganization Plan No. 12 (p. 54). The scheme is another flanking movement aimed at the Taft-Hartley Act. Either house can vote the plan down. The reorganization would take powers from the National Labor Relations Board's general counsel and give them to the board. The board, as under the old Wagner Act, would again be judge, jury and prosecutor. What's more, the move would put a roadblock in the way of effective administration of T-H by complicating NLRB's work.

FOREIGN— When the Marshall Plan ends in mid-1952, will Europe still need American aid? The program is about half over now (p. 58), but it looks as if some ECA objectives cannot be completely realized in the next two years. Production goals will be no problem. Physical reconstruction will be finished. The dollar gap should be about closed. But unemployment will not be solved, nor will economic unity be much closer to realization.

HERE AND THERE IN INDUSTRY—For the next three weeks, the House Judiciary (Celler) Committee will pound away at U. S. Steel Corp. (p. 53) . . . Hearings start Apr. 18 on lower freight rates proposed by eastern railroads; truckers will object (p. 53) . . . Action on the freight absorption bill is postponed until some indefinite time (p. 53) . . . Connecticut finance advisory committee has approved $60,000 for an engineering survey for the proposed New England steel mill (p. 53) . . . Sales of gasoline dispensing pumps, although still below prewar levels, are increasing (p. 51) . . . Industry, trade associations and government are stepping up their drive to curb stream pollution and conserve and redistribute water (p. 50) . . . American Standards Association's library can help your export trade (p. 59) . . . American Society of Tool Engineers at its Philadelphia convention last week passed a resolution pledging full co-operation with Army Ordnance in the preparedness program; ASTE also set up a research foundation of $25,000 for new tool engineering techniques . . . Three out of four Inland Steel Co. employees prefer Inland's contributory pension plan to the non-contributory program also available.

Production-Engineering News—p. 75 *Market Summary—p. 115*

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STEEL
A PENTON PUBLICATION

U. S., Reds: Ore Resource Rivals

They are the only two nations with adequate reserves to expand steel industries in keeping with areas and populations. Neither has enough to last a century

THE UNITED STATES probably has access to a slightly greater iron ore reserve than Russia, but neither country's reserves can last even a century if consumption follows the growth predicted by economists.

The reserves would be consumed even faster if there were a war. Easily minable large deposits of at least 50 per cent iron will have almost disappeared in a few years from Russia and the U. S., as well as from other major industrial countries. Those estimates and the ones to follow take into account actually known reserves only. Potential reserves are often meaningless now because they can't be mined economically for years to come.

In the Lead—The U. S. has access to a primary ore reserve of 8096 million gross tons; Russia, an estimated 6060 million tons (see chart). Neither figure includes low-grade magnetic ore such as taconite that must be up-graded from 25 per cent iron to 60 per cent. John W. Gruner of the University of Minnesota estimates that reserves of open-pit magnetic taconite in the Mesabi are sufficient to produce 1.8 billion tons of concentrates containing 60 to 65 per cent iron. Russia's reserves of low-grade ore are probably higher. Mr. Gruner gave his appraisal of the world's iron ore resources at the American Institute of Mining & Metallurgical Engineers' blast furnace, coke oven and raw materials conference in Cincinnati, Apr. 10-12.

What will the U. S. and other industrial nations be doing about iron ore by the year 2050? Probably these three things: Mining small but new domestic deposits certain to be discovered in the next century; beneficiating more low-grade domestic ore; tapping rich deposits in such areas as Brazil and India that now cannot be economically mined because of distance.

Where are the known ore reserves? Mr. Gruner summarizes them:

The United States—For the next ten years the Mesabi will continue to supply most of America's ore, probably 45 million tons a year. Not counting taconite, the area has a reserve of 1.1 billion tons. The entire Lake Superior region has a reserve of 1646 million tons, including 250 million additional tons for the Mesabi and 300 million in Michigan that are yet to be found. Don't look for spectacular ore discoveries here, but small strikes are likely. The iron ore industry should be taking out about 5 million tons of magnetic concentrates from the region by 1956.

The Adirondack district of New York state is the chief producer of ore in the northeastern states. One or two million tons, largely as concentrates of magnetite, have been the yearly productions. It's unlikely that more than 4 or 5 million of concentrates per year will be produced in the next few decades.

Alabama is the leading ore producer in the Southeast, with a reserve of over 1 billion tons of 35 per cent iron. The Birmingham district probably will continue to produce at least 7 million tons a year.

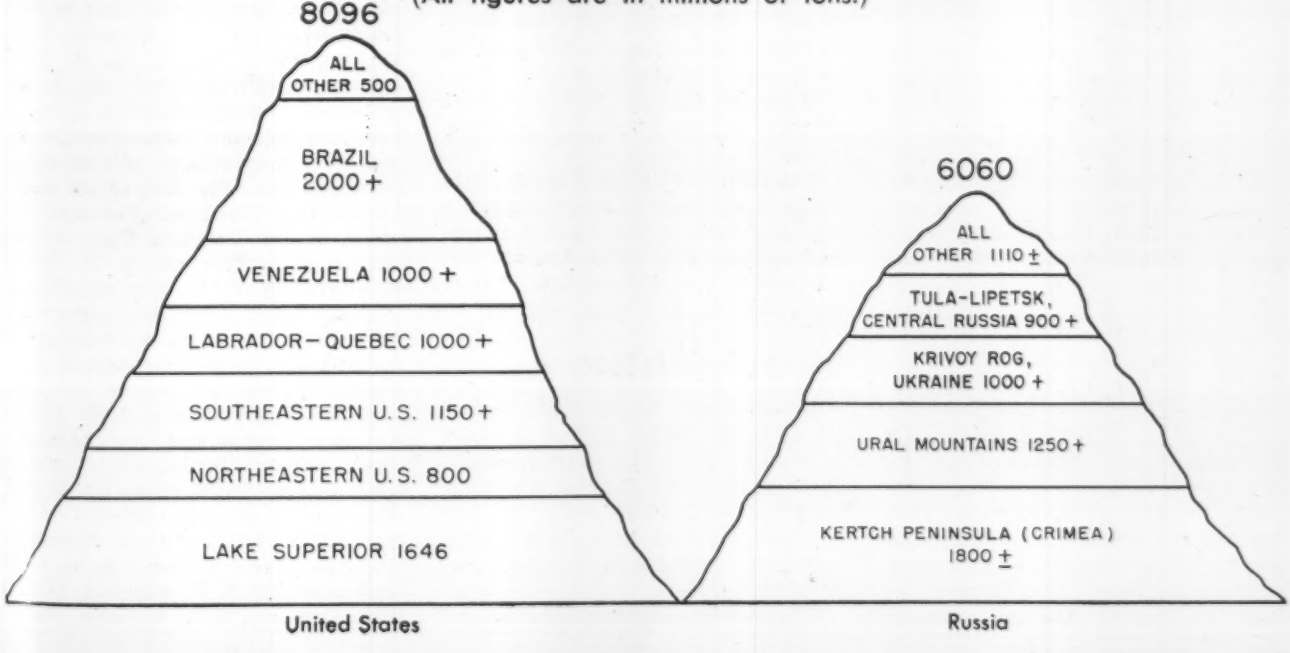
California, Utah and Wyoming have a known reserve of about 300 million tons. Their mines will produce 2 to 3 million tons of ore yearly.

Canada—Reserves of about 50 million tons of 50 per cent or better iron exist at Steep Rock Lake and in the Michipicoten district of Ontario. Production from the two areas now is about 2 million tons annually, but will increase soon.

Underground reserves of Wabana ores in Newfoundland are enormous but difficult to mine. Production

Available Ore Reserves for U. S. and Russia

(All figures are in millions of tons.)



most of which goes to Europe, is not likely to exceed 2 million tons yearly.

In the Labrador-Quebec area, 500 million tons of rich, open-pit ore are in sight. More is probably there, but difficult to get. Ore output in Labrador will become important within eight years and may reach 8 million tons by 1961. Production may never exceed 25 million tons annually.

Central America—The only important ores of this area are in Cuba, but they are of such low grade that they won't be of economic interest for several decades.

Venezuela—Known ore reserves in Venezuela total about 1 billion tons. Quantity shipments of several million tons a year won't be coming to the U. S. for another six years, but we should be importing about 12 million tons a year by 1965.

Brazil—The drawback to the rich Minas Gerais deposits of Brazil is the 5800 mile trip by train and ship to get the ore to the U. S. Reserves of at least 2 billion tons of ore exist in the country.

Chile—Major deposits are at El Tofo, Coquimbo, with a yearly output of 2 million tons of magnetic ore running over 60 per cent iron. That rate will continue for a number of years.

Russia—Richest and largest deposit now being worked in Russia is in the Krivoy Rog district of the Ukraine. It will be the leading producer for years to come. Ore assays at 50 per cent iron or better; reserves total at least 1 billion tons. Another large, high-grade deposit is being worked at Magnitogorsk in the Urals, with a probable yearly production of 7 million tons by open-pit methods. Other major operations are in the Urals, at Kursk in central Russia, Tula-Lipetsk in central Russia, on the Kertch peninsula in the Crimea, in the North Caucasus and Trans-Caucasus mountains, at Bratski-Ilimski west of Lake Baikal and at Novosibirsk-Krasnoyarsk in western Siberia.

Germany and Austria — Germany depends on Swedish and Lorraine ores for much of her steel production. The Salzgitter-Peine ores, about 30 miles east of Hanover, are poor in quality although about 1760 million tons exist. Nobody but Hermann Goering ever had the nerve to call it real iron ore. The material is used to produce expensive steel at the Goering works near Brunswick. Low-grade ores mined underground are found in the Lahn-Dill and Siegerland areas. Some low-grade ores occur in southern Germany. The Erzberg deposit in Styria, Austria, contains about 200 million tons of carbonate ore.

France—The French have a reserve of 3 billion tons of basic iron ore and 3 billion tons of acid iron ore in Lorraine and 1.8 billion tons of ore difficult to mine in Normandy and Brittany. The French can produce up to 40 million tons annually, all but 2 million from Lorraine.

United Kingdom—Britain can produce 15 million tons of low-grade ore a year, 90 per cent of it from the Midlands. Reserves here exceed 1 billion tons. Another deposit is in Cumberland, but only 100 million tons are still available. Britain's major ore suppliers are Sweden, Spain, Newfoundland and Sierra Leone, Africa.

Sweden—Her largest reserves, over 1 billion tons, are in the Kiruna-Gellivare district. The grade is high. The most important other deposit is at Grangesberg.

Spain — Her most important reserves are in northern Spain along the Biscayan coast. About 500 million tons of 40 to 45 per cent iron exist in the area. Top ore production is about 6 million tons a year.

Africa — Some ore comes from Sierra Leone and Liberia, but deposits in both countries are still in the development stage. Large tonnages won't come from either area for years. The Union of South Africa has large reserves, but they are not extensively developed. The Mountain of Iron in northwest Petrrio contains at least 150 million tons of rich ore.

India—In her Bihar and Orissa provinces, India may possess the largest deposits in the world. They amount to several billion tons. Several million tons are being mined annually, but the total is not likely to rise for many years because the Indian steel industry can't use much more and distances are too great to other industrial countries.

Philippine Islands—Low-grade ores here are of little economic importance now.

Australia—Two high-grade districts are at Pilot Knob in South Australia and at Yampi sound on the northwest coast. Pilot Knob has at least 130 million tons of good ore. Yampi has 90 million tons in its reserve.

Iron Ore Imports Soar

United States steel companies last year brought in 8.3 million net tons of iron ore from 18 countries, chiefly Sweden, Chile and Canada, American Iron & Steel Institute says. Imports were at a record high, 22 per cent more than the 6.8 million tons imported in 1948.

The cost of producing taconite concentrates in the domestic program is estimated to be from $15 to $20 per ton of annual capacity.

Stassen, Weidlein AISI Speakers

Going to the American Iron & Steel Institute's 58th general meeting at Waldorf-Astoria in New York? If so, you'll hear Dr. E. R. Weidlein, director of the Mellon Institute of Industrial Research in the Schwab Memorial lecture May 24, and Harold E. Stassen, University of Pennsylvania president, at the annual dinner May 25.

Walter S. Tower, institute president, R. E. Zimmerman, U. S. Steel, vice president, and Hiland G. Batcheller, Allegheny Ludlum, chairman, will address the general session on May 25.

What Happened in Coal—Harry M. Moses, H. C. Frick Coke Co., and George H. Love, Pittsburgh Consolidation Coal Co., will discuss contract negotiations in the coal industry at the industrial relations session.

Technical Sessions—Four technical sessions are scheduled for May 24. They include:

1. Raw Materials and Operations. W. F. Munford, American Steel & Wire, will be chairman. Papers include: "Materials Handling in the Steel Industry" by W. N. Flanagan and W. G. Nichol, Carnegie-Illinois; "The Handling and Storage of Refractories" by George H. Todd, Armco Steel; "Present and Prospective Sources of Supply of Steelmaking Raw Materials" by C. C. Henning and R. W. Braund, Jones & Laughlin.

2. Electronic Control. H. W. Johnson, Inland Steel, will be chairman. Papers: "Use of Electronics for Main and Auxiliary Steel Mill Drives" by W. R. Harris, Westinghouse Electric; "Electronic Controls as Used in Finishing Steel" by R. W. Barnitz, Jones & Laughlin; "The Future of Electronics in Steelmaking" by L. A. Umansky, General Electric.

3. Testing and Inspection. F. H. Fanning, Armco Steel, will be chairman. Papers: "The Use of the Spectroscope in the Steel Industry" by E. O. Waltz, Republic Steel; "Some Experimental Techniques in Stress Analysis" by W. M. Murray, Massachusetts Institute of Technology; "The Electron Microscope in Metallurgy" by Alfred L. Ellis, International Harvester.

4. Shipping Problems. A. F. Franz, Colorado Fuel & Iron, will be chairman. Papers: "Problems of Truck and Barge Shipments" by H. D. Rhodehouse, Republic Steel; "Packaging Tin Plate" by D. H. Dellinger, Weirton Steel; "Protection of Steel in Transit" by A. H. Andrews, Bethlehem Steel.

PANEL AND SPONSORS: Economists addressing the economic forum at the ASTE meeting and the forum's sponsors are: (Left to right, seated) Dr. C. Canby Balderston, Wharton School of Finance & Commerce; Dr. Edwin G. Nourse, former chairman of the President's Council of Economic Advisers. Standing: R. B. Luchars, president, Industrial Press; E. L. Shaner, chairman, Penton Publishing Co.; Joseph Livingston, business columnist; Paul Wooton, chairman of forum; J. S. Hildreth, president, Chilton Co.; and Robert B. Douglas, ASTE president

Atomic Power for Industry?

Tool engineers ask opportunity to work with government on adaptation for peacetime uses . . . Economists optimistic on near-term prospects; doubtful on long term

THE United States may lose its industrial leadership to Russia unless U. S. industry is given an opportunity to develop atomic energy for industrial purposes.

This is the warning by Robert B. Douglas, retiring president of the American Society of Tool Engineers, at an economic forum at the society's 18th annual meeting in Philadelphia.

Mr. Douglas believes the Russian government will make atomic energy available to its industry. If so, Russia may be able to quickly overcome its production shortages.

He suggests engineering societies be called in to co-operate with atomic energy authorities on doing something about the "force which has such enormous potentialities to give us a better living."

How's Business? — The economic forum was sponsored by three industrial publishers—Penton Publishing Co., publisher of STEEL; Industrial Press and the Chilton Co.

Economists on the panel: Dr. Edwin G. Nourse, who endeared himself to industry when he quit as chairman of the President's Economic Council in protest against continuing federal deficits; Dr. C. Canby Balderston, dean of Wharton School of Finance & Commerce; Joseph A. Livingston, business columnist; and Edward T. Cheyfitz, former labor union leader.

"Wealth Engineering"—That's Dr. Nourse's definition of his profession (economics) to the tool engineers. But whereas the tool engineer works with materials whose qualities are known, the economist must deal with 150 million unpredictable "anarchists." This makes the economy difficult to predict and even more difficult to control.

Dr. Nourse doubts that we have the tools to control the economy. And even if we knew what steps to take, he questions whether the people would accept the indicated course of action in time.

While predicting good business for the period immediately ahead, Dr. Nourse believes the U. S. is not facing realities and storm warnings should be hoisted.

High Ground Ahead — Since the war we have advanced to a new plateau and the ground ahead looks high. This is Dr. Balderston's appraisal.

He expects high industrial activity and satisfactory earnings at least through the second quarter.

For the second half, Dr. Balderston is optimistic but hedges a little. Capacity has been expanded tremendously and may be embarrassing to some companies. Fixed costs—wages, taxes, freight and some materials (supported farm products)—have advanced sharply and raised break-even points to high levels. Diminution of volume will quickly be reflected in earnings.

Labor Problems—Mr. Cheyfitz is concerned over the effect of the rise of unionism on productivity. He sees three union roadblocks to greater output per man-hour: 1. Featherbedding; 2. resistance to managerial or scientific techniques; 3. collective bargaining demands that short-circuit management's role.

He suggests that these moves by the unions are based on fear and recommends that management try to sell the unions on the job that management is trying to do.

"Old War and Cold War"—Mr. Livingston is bullish. World War II was responsible for raising the economy to its present plateau because it: 1. Eliminated unemployment for the first time in years; 2. raised wage rates; 3. raised farm income; 4. uprooted people and created new desires for many commodities.

The cold war will not permit us to slip back into low economic activity. Federal budgets will continue high. There will be no depression until we have used up a vast shelf of public works projects.

To which Dr. Nourse retorts: "We are buying prosperity out of deficits."

ASTE PRESIDENT: Herbert L. Tigges, executve vice president, Baker Bros. Inc., Toledo, is president of the American Society of Tool Engineers for 1950-51

Die Castings Taking More Zinc

They figure in your life throughout the day from the morning shave to the bedtime nip. Now they rank second only to galvanizing as a zinc consumer

YOU may not be aware of it but more and more you are dependent on zinc die castings. In an unobtrusive way, they are doing jobs you take for granted.

A zinc die casting may have been the handle that turned to bring hot water for the morning shave. One may have been a part of a can opener that opened a can of fruit juice for breakfast. All through the day they continue to help you live and work, for they're found in automobiles, radios and television sets, clocks, cigaret lighters, radios, washing machines, tools and machinery.

Ten-Fold Growth—This growth in importance of zinc die castings came up for attention at the American Zinc Institute's 32nd annual meeting at St. Louis last week. One of the speakers, R. G. Kenly, manager, metal division, New Jersey Zinc Sales Co., pointed out that the per capita consumption of zinc die castings grew (see accompanying chart) from only one-fourth of a pound in 1926 to 1 2/10 pounds in 1936, and on to 2¾ pounds in 1949.

The 1949 rate represents a total annual consumption of approximately 200,000 tons of zinc a year, making the zinc die castings industry the second largest user of zinc. Galvanizers still hold first place in zinc consumption.

Coming of Age — Commenting on this growth, Mr. Kenly says: "As might be expected of a growing industry, like a growing child, the rate of growth was very fast at first. This rate is now lessening, but the consumption per capita still is increasing."

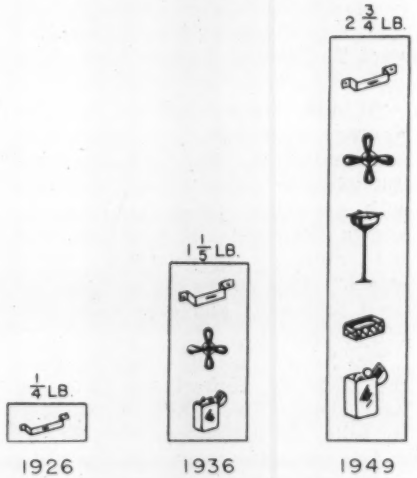
Mr. Kenly cites the expected increase in the country's population as a reason for believing that the total tonnage of zinc die castings should be greater ten years hence than today. "Even if for some reason, now unforeseen, the consumption per capita of zinc for die castings should not continue to increase during that period, but remain constant at the 1949 figure, the expected population increase should be some assurance that a good tonnage of zinc will still be needed."

Stationary Total—While the use of zinc for die castings has been on the increase the overall consumption of zinc has remained stationary, he says. Consumption of zinc for all purposes—galvanizing, die castings, brass, rolled zinc, etc.—has been approximately 11½ pounds per capita annually for the last ten years.

Briefly reviewing the history of zinc die castings, Mr. Kenly emphasized the improvement in quality. "In the very early days of the die casting industry, zinc alloys of a sort were used for the production of die castings. Not too much attention was paid to the metallurgy of these alloys, mainly because very little was known about it. Many of the castings showed a perverse and alarming tendency to crack and even crumble after a few years of service," he recalled. Development of proper alloys straightened out matters. "As a matter of fact, they have been working successfully for nearly 20 years, serving industry well and providing a means of livelihood for many persons, and an outlet for a substantial tonnage of special high grade zinc," he said.

Per Capita Use Up

. . . on zinc die castings



Celebrating 140th Year

The nation's second oldest producer of iron castings, the air-furnace foundry of Hunt-Spiller Mfg. Corp., South Boston, Mass., is observing its 140th anniversary.

Established in 1810 by Cyrus Alger, a native of Bridgewater, Mass., the foundry became a leading ordnance manufacturer. In 1834 it produced the first rifled iron cannon produced in America; eight years later it poured the "Columbiad," a 12-inch mortar with a range of more than two miles.

The 11-inch Dahlgren gun carried by the Monitor in her battle with the Merrimac and the guns that sank the Alabama were also products of the South Boston foundry. Late in the 1870s the foundry began manufacture of locomotive castings and by 1930, 38 years after its reorganization as Hunt-Spiller, it was serving more than 85 per cent of the nation's railroads.

Now in a ten-acre plant not far from its original site, the foundry is casting cylinder liners for diesel locomotives, piston rings, heavy-duty brake drums and components for radar, aircraft and other precision equipment.

Water Level Ebbs

Industry, trade associations, and government work to curb stream pollution, save water

APRIL showers may bring May flowers, but not enough water to bolster materially America's dwindling supplies. Industry, trade associations and government are adding their forces, too, to curb stream pollution and to conserve and redistribute water.

Expensive Water—The steel industry spends about $10 million annually to keep clean the streams it uses, American Iron & Steel Institute says. In addition, the industry has more than $10 million invested in equipment to purify its major waste liquid, used pickle liquor. There is, as yet, little or no financial return on the investment to prevent stream pollution.

Other methods used by steel producers to stop pollution include: Dust catchers to control flue dust from blast furnaces, thus keeping solids from being carried into streams with waste cooling water; control of phenol water, a poisonous coke oven waste, by using it to quench hot coke after it is pushed from the ovens; preventive measures, involving in some cases the installation of an oil skimmer, to keep oil from escaping into streams.

Water-Logged—If you have any suggestions on water pollution prevention, write the Water Policy Panel of the Engineers' Joint Council, 33 W. 39th St., New York. By June 1, that panel must formulate a statement of professional engineering opinion pertaining to policy and practice in conservation, utilization and protection of water resources for consideration and guidance of the new

AFTER U: The 18,000-ton hydraulic machine seen here presses U-shaped pieces formed on a 2000-ton U-ing press into their finished shape. Both machines are among the major units in the production line of the new electric welded pipe mill of U.S. Steel's National Tube Co. at McKeesport, Pa. The U-ing press gets its name because it forms steel plate into a U shape

federal Temporary Water Resources Commission.

Besides that government agency, Department of the Interior's Bureau of Reclamation is also interested in water. In the 1949 fiscal year, it carried out in 17 western states the most extensive river basin water conservation program in its 47-year history. The bureau last year supplied irrigation water for more than 5,380,000 acres of land and 18,250 billion kwhr of hydroelectric power.

Harnessing Water — The bureau spent a record $250 million in fiscal 1949. At the end of the fiscal year, the bureau had in operation, under construction or authorized, 81 irrigation and multipurpose projects. Sixty-five of these projects or divisions of projects were producing agricultural products, electric energy or furnishing municipal industrial water.

During the 1949 fiscal year, the bureau had in operation 17 power plants with a total installed capacity of 2,757,400 kw. Nine new power plants that will have an ultimate capacity of 779,600 kw were under construction.

Association Elects 1950 Officers

Officers of the National Association of Engineering Companies elected for 1950 are: President, Harry L. Murray, Murray Engineering Co., Detroit; vice president, Walter M. Schmitt, Product Engineering Service Inc., Detroit; secretary-treasurer, Walter R. Jackson, Modern Engineering Service Co., Berkely, Mich.

Steel Fabricators' Hope Rising

Hopes are rising among steel fabricators that moderate improvement in their business is something more than a normal spring upturn. But the business chart is so clouded that it makes a trendline impossible to discern.

L. Abbett Post, executive vice president, American Institute of Steel Construction, is cautious when he comments that fabricated steel shipments have risen in the last few months. He notes that fabricators' activity is not as good as overall construction figures indicate.

About 200 representatives of AISC member firms gathered last week in Chicago for the institute's engineering conferences. Although they did not discuss business conditions in their formal program, the topic occupied their corridor conversations.

More Gasoline Used, But Pump Sales Lag

"FILL 'ER UP!" Gasoline service station attendants have been hearing that with increasing frequency since the war as gas consumption soars. It should mean a stronger flow of business for manufacturers who make the pumps that dispense the fuel. But it hasn't.

Production by manufacturers of power-driven meter gasoline pumps in the United States last year was 24 per cent less than in 1939 (see accompanying chart). The total dollar value of gas pump production was 28 per cent higher in 1949 than in 1939—an estimated $27,250,000 worth last year compared with $21.3 million in 1939. Gas pump prices have gone up in the last decade. Pump makers' labor costs are now 120 per cent more than in 1939.

What's the Story?—Glance at the chart and you'll get an idea why gas pump production has gyrated so. Output in 1947 of over 200,000 units was nearly double the 1939 level. That saturated the market. The manufacture of gasoline pumps is largely one of assembly. Companies that make pumps or meters for other purposes can switch to gas pump manufacture for short periods. Many did in 1947. The result: An overexpansion in the industry immediately after the war, from which it is only now recovering.

The industry is back to about 11 manufacturers today, and production is rising to the 1939 level again. Manufacturers estimate that 92,400 units will be produced in 1950, 10 per cent more than last year.

Shifting Ratio—The industry now sells 65 per cent of its output to major integrated oil companies that own service station chains and 35 per cent to nonintegrated marketers. Before the war, 55 per cent went to the integrated companies, 45 per cent to smaller independents.

There are ten major parts in the gasoline pump: The electric motor, the pumping unit, the air eliminator, the measuring meter, the unit and money sale mechanism, the chassis, the housing, the electric wire system, the flow indicator and the filling feature consisting of the hose and nozzle. Brass, copper, steel and a little lead are used in most pumps.

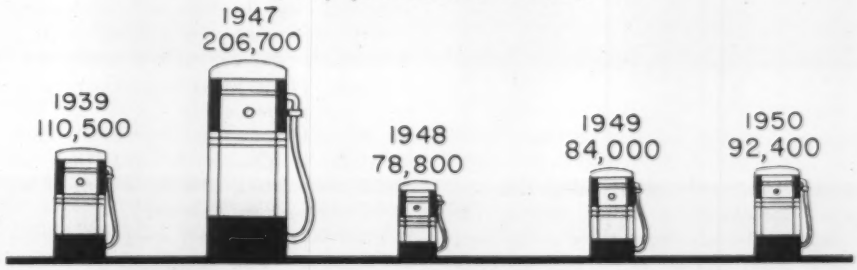
Assembly Basis — None of the manufacturers makes his own motors, pipe, fittings, wire, electric fittings, gasoline hose, computing heads, dial registry mechanisms or porcelain coated sheets. Most of the major companies make their own meters, housings, air eliminators and, in some cases, pumping units and nozzles.

There have been few new developments in the gasoline pump since the advent of the computing device in 1933 and the adoption of the registry setback mechanism a few years later. The latter prevents delivery of gasoline until the registry indicator on the pump face is set back to zero.

Gasoline Pump Industry Reviving

. . . but sales still are below prewar

(Pump production is in units)



Source: Bureau of Census for 1939 and 1947 figures; others estimated

Predictions Correct

Steel output in first quarter third best mark for the period despite coal strike effects

STEEL PRODUCTION figures are showing the economic forecasters' predictions of good business for at least the first half of 1950 were correct.

The American Iron & Steel Institute reports that despite the retarding effects of the coal miners' strike early this year the production of steel for ingots and castings in the first quarter totaled 22,169,924 net tons, an amount exceeded in only two previous first quarters, those of 1949 and wartime 1944. First quarter output in 1949 was 24,052,146 tons and in 1944, 22,612,869 tons.

Output thus far in April has been above 95 per cent of capacity and ordering of steel continues at a brisk pace.

The first quarter output of 22,169,924 tons consists of 7,930,372 tons in January, 6,793,245 tons in February, and 7,446,307 tons in March. The March production was about 1 million tons below the record production of 8,387,927 tons in March, 1949.

The March increase of 653,062 tons over February was limited by effects of the miners' strike.

Steelmaking furnaces were operated at 90.4 per cent of capacity in the first quarter, compared with 101.5 per cent a year earlier. Operations in March were at 88.2 per cent of capacity, in February at 89.1 per cent, and in January at 93.9 per cent.

Period	Open-hearth Net Tons	Open-hearth % Capac.	Bessemer Net Tons	Bessemer % Capac.	Electric Net Tons	Electric % Capac.	Total Net Tons	Total % Capac.	Calculated Net Tons Weekly	No. weeks in mo.
1950										
Jan.	7,131,519	96.5	379,252	80.6	419,601	71.9	7,930,372	93.9	1,790,152	4.43
*Feb.	6,142,178	92.0	255,565	60.2	395,502	75.0	6,793,245	89.1	1,698,311	4.00
†Mar.	6,728,855	91.0	265,726	56.5	451,726	77.4	7,446,307	88.2	1,680,882	4.43
1st Qtr.	20,002,552	93.2	900,543	65.9	1,266,829	74.7	22,169,924	90.4	1,723,944	12.86

Note—The percentages of capacity operated are calculated on weekly capacities of 1,668,287 net tons open-hearth, 106,195 net tons bessemer and 131,786 net tons electric ingots and steel for castings, total 1,906,268 net tons; based on annual capacities as of January 1, 1950 as follows: Open-hearth 86,984,490 net tons, bessemer 5,537,000 net tons, electric 6,871,310 net tons, total 99,392,800 net tons.
* Revised. † Preliminary figures, subject to revision.

Six Take More Steel

Six consuming groups took more finished steel in February than a year earlier despite lighter shipments to most industries than in February, 1949.

These six, says the American Iron & Steel Institute, are: Automotive; oil and gas; containers; makers of bolts, nuts, rivets and screws; manufacturers of contractors' products such as plumbing and hardware; and a group covering office supplies and sporting goods.

The automotive industry continued to be the largest buyer, taking 21.5 per cent of the steel shipped in February, compared with 21.7 per cent in January and 17.4 per cent in February, 1949.

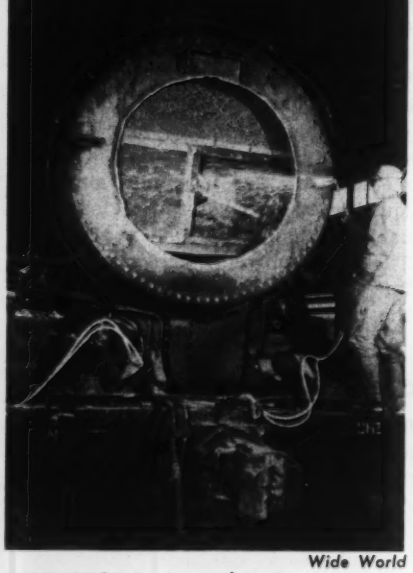
Jobbers and dealers, exclusive of those specializing in goods for oil and gas, took 16.2 per cent of the February steel shipments, compared with 15.4 per cent a year ago. Jobbers and dealers constitute the second largest steel buying group.

Third largest steel buying group is construction. It took 12.1 per cent of the steel shipped in February.

February's finished steel shipments from mills totaled 5,134,780 net tons, compared with January's 5,482,691 tons. February operations were retarded by the coal miners' strike.

Cold-rolled sheet tonnage led all others in February shipments. That product accounted for 671,338 tons, or 13.1 per cent of all finished steel shipments that month. Next are hot-rolled bars (including light shapes), the tonnage of 601,713 being 11.7 per cent of all shipments. Following closely were hot-rolled sheets with a tonnage of 573,299 and a percentage of 11.2. Next most important product was considerably down the line as far as tonnage is concerned. That product is plates, 346,379 tons of them, amounting to 6.7 per cent of all steel shipped in February.

February's finished steel shipments of 5,134,780 tons consisted of 4,779,148 tons of carbon steel, 324,130 tons of alloy (other than stainless), and 31,502 tons of stainless.



Wide World

LAST STOP: A workman presses in close on a big locomotive that Weirton Steel Co. bought and is dismantling. Weirton is now using the old iron horses as a major source for scrap. Already more than a hundred have been turned into scrap for conversion into new steel

BRAINY: The office equipment industry, growing more horizontally than vertically because of complex office procedures, has another brain child—Univac. The high-speed, universal, automatic computing system is manufactured by Remington Rand. Here, Dr. John W. Mauchly and J. Presper Eckert Jr., inventors of Univac, review it with Lt. Gen. Leslie R. Groves, USA Ret., director of the company's scientific research

Koppers To Build J & L Ovens

Jones & Laughlin Steel Corp. has awarded Koppers Co. Inc. a contract to construct a battery of 59 coke ovens at its Aliquippa, Pa., works. The battery will be of the Koppers-Becker underjet type.

Koppers also will construct an extension to J & L's present boiler plant and will complete additions and alterations to the company's coal handling equipment. Cost of the whole project will be over $4 million. Work will be completed early in 1951.

When the new battery is completed, J & L will have 352 coke ovens at Aliquippa, all but 81 of recent construction. The facilities will be capable of carbonizing 8500 tons of coal per day.

U. S. Steel Under Fire

Celler committee starts three-week inquiry into pricing, other policies

FOR the next three weeks, the House Judiciary (Celler) Committee will pound away at the United States Steel Corp., its pricing policy and other activities. The committee has broadened the scope of the hearings, starting today, and has alloted a third week for the inquiry.

U. S. Steel officials will appear before the committee Apr. 26 and 27. The remainder of the time will be devoted to Interior, Commerce and other government officials and to competing steel producers and to customers of the corporation. Names of witnesses are not being made public in advance. Hearings will be in the big House caucus room.

Cat at the Mouse Hole—Meanwhile, the Department of Justice continues to follow a policy of "watchful waiting" as far as U. S. Steel is concerned. Recent reports of early impending action looking toward breaking the leading steel interest into a number of independents are without foundation. Justice Department has had something to do with the preparation of plans for the Celler committee hearings and will study testimony brought out in these hearings before developing a course of action in reference to the steel corporation.

"Justice does not have only U. S. Steel under observation," a spokesman told STEEL, "but is interested in large corporations generally whose activities come into focus under the antitrust laws." The inference is that there is no immediate intention to "pull the trigger" on U. S. Steel.

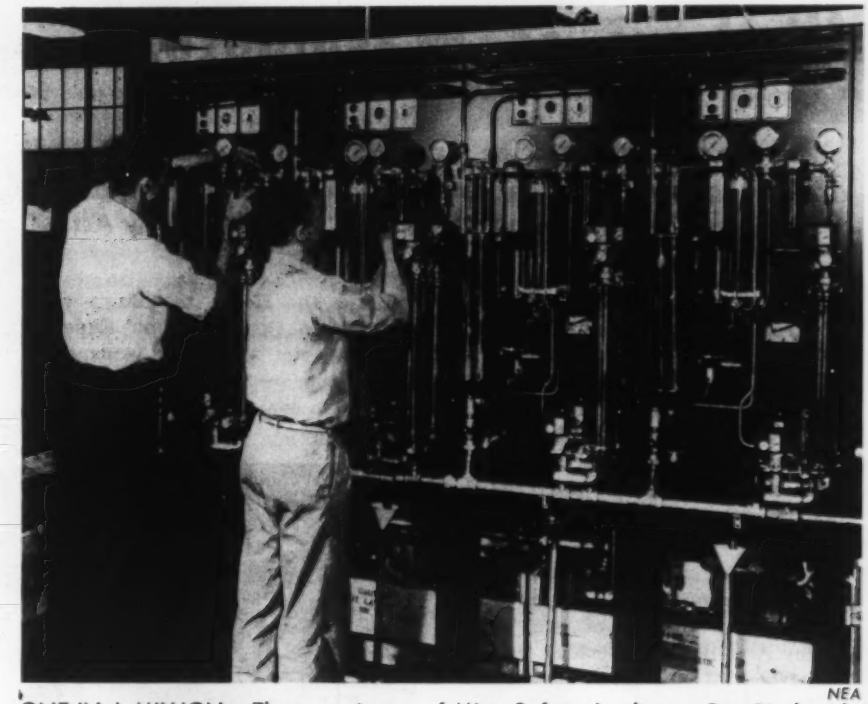
Freight Cut Arguments

Arguments on proposed 25 per cent rail freight rate reduction within Official Territory May 1 on 80,000-pound carload shipments of iron and steel products will be heard before Interstate Commerce Commission, Apr. 18. Trucking interests are expected to object to the proposal.

Eastern rail carriers contend they are transporting less than half the total finished steel tonnage moved by rail and truck. The carriers' petition before ICC in justification of the proposed rate reductions cited a comprehensive study conducted during one week in December, 1949. It showed trucks were handling 52.2 per cent of total steel carried by the two groups. On some important items—such as sheets and strip—the truckers' percentage was 72.5 per cent. Total tonnage moved by trucks for other steel products covered in the survey are shown on percentage basis in the table below.

	% Truck Tonnage of Total
Tin and Terne plate	58.9
Plates	22.4
Bars	53.1
Pipe, tubes and fittings	12.5
Wire and wire products	50.5
Shapes and piling	7.6
Other	14.9

The proposed rates are not designed to meet competition of carriers on inland waterways, including the Great Lakes. They will be substantially higher than the overall cost of shipment by water.



NEA

ONE IN A MILLION: These engineers of Mine Safety Appliance Co., Pittsburgh, are making adjustments on one of the new carbon monoxide recording instruments to be installed in the Holland tunnel by the Port of New York Authority. The instruments are so sensitive that they can detect as little as one part of deadly carbon monoxide in a million parts of air. The improved analyzers will replace similar equipment installed in the tunnel by Mine Safety in 1927

Freight Bill Delayed

Senate opponents of the freight absorption bill—S. 1008—won another victory last week when they defeated by a vote of 36 to 35 an effort to call up the conference report on that measure.

Majority Leader Scott W. Lucas set the pattern of the ballot by insisting that the rivers and harbors bill was the unfinished business and should have priority. But he promised it would be called up—at some indefinite time.

Sen. Russell B. Long (Dem., La.) added: "We anticipate lengthy debate on the report when it comes before the Senate consideration." The conference report has been approved by the House and needs only Senate action to go to the White House.

Survey for New England Mill

Connecticut finance advisory committee has approved a $60,000 appropriation to pay for an engineering survey for the proposed New England integrated steel mill. Survey will be conducted in the New London-Groton area.

New England council, which initiated the move for the New England mill, estimates a 1,250,000-ton mill would be economically feasible (STEEL, Feb. 6, p. 53). Bulk of production would be flat-rolled items.

Whiting Gets Coburn-Foster

Whiting Corp., Harvey, Ill., manufacturer of materials handling equipment, took over the belt and chain conveyor business formerly operated as Coburn-Foster Conveyor Co., Chicago.

The acquisition will permit Whiting to broaden its line; it has produced cranes, hoists and other material handling devices for over 60 years.

The chain and belt conveyor group will be headed by Gordon Foster, former president of Coburn-Foster. He will work under A. E. Bottenfield, vice president in charge of Whiting merchandise sales. The conveyor equipment will be manufactured at the Whiting plants at Harvey, and Los Angeles.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

If you don't want to see the NLRB dominated by labor, tell your congressman right away to vote down Reorganizational Plan No. 12. It would dynamite the Taft-Hartley Act

EMPLOYERS eager to nullify the threat of full labor domination of the National Labor Relations Board and its administration of the Taft-Hartley Act should lose no time in asking their congressmen to disapprove President Truman's Reorganization Plan No. 12. Unless voted down by either house, the plan will go in effect on May 23.

Plan No. 12 is seen in Washington as a labor-inspired move to circumvent the key feature of the Taft-Hartley Act; it would destroy the independence of the general counsel and make him subservient to the board and its chairman. Thus, in defiance of the intent of Congress, the board would again, as under the old Wagner Act, be judge, jury and prosecutor.

That this is no idle fear is shown by the redistribution of duties proposed by Chairman Paul M. Herzog on Feb. 23. By the changes then in mind, the board would take control over all regional and subregional directors—their "selection, retention, transfer, promotion, demotion, discipline, discharge." General Counsel Robert N. Denham fought the proposal, saying it would strip him of authority to direct prosecutions.

Possible Two-Year Impairment—If the independence of the general counsel is vitiated and his duties transferred to the five-man board and its chairman, Mr. Denham declares, a "substantial number" of the parties found guilty by the board will rush to the courts to test the legality of NLRB decisions. "For at least two years effectiveness of the management-labor law will be seriously impaired until the issue is settled in the Supreme Court. Should the court hold Plan No. 12 illegal, the work of the board . . . would be illegal and void. In effect, enforcement . . . of the law against both labor unions and management would be completely nullified."

Accusation of Pro-Labor Bias—Mr. Denham has already accused the five-man board of pronounced pro-labor bias in various decisions and in its overall policy.

The House Committee on Expenditures already has given its blessing to Plan No. 12, and it remains now for the House to take a vote. The Senate Committee on Expenditures has not acted but is expected also to approve the plan, with a Senate vote to come later.

NEA

HUNGRY HORSE TAKES PIPE: Major job of installing the sections of the 13½-foot diameter penstock pipes has begun at the Hungry Horse, Mont., project. Here, one of the 20-foot long, 20-ton sections is taken to the dam to be welded into place. About 1800 feet of pipe will be embedded in the 564-foot high dam to carry water to four huge turbines. In the background you can see the 36-foot diameter diversion tunnel that carries the south fork of the Flathead river around the dam site

Gray Task: Dollars to Europe

President Truman gave Gordon Gray an assignment to keep him busy until he assumes his new position as as president of the University of North Carolina in September. His job will be to formulate a program that will bolster our exports to Europe when the Marshall Plan is ended in 1952.

Boiled down, Mr. Gray's job will be to help get more dollars into the hands of Marshall Plan nations. The general plan includes: Lower tariffs on many foreign products, the encouragement of more foreign imports, stimulation of U. S. capital investment abroad, increased U. S. travel in Europe, American patronage of European services like shipping and insurance, etc.

Mr. Gray is to advise the State Department's Trade Agreements Committee on the plan to extend new tariff concessions when trade agreements come up for renewal this fall.

The Rub About Reciprocities

It will not be easy for the Truman administration to please labor in the forthcoming negotiations on reciprocal trade agreements.

The international unions—particularly the AFL and CIO—are on the record as favoring reciprocal trade in principle and in supporting the concept that friendly foreign nations should be enabled to get more dollars by selling more of their products here.

Rub and Howl—But there's a rub. It comes when specific products are mentioned. Labor then begins to howl. The unions flatly oppose concessions that would increase imports of goods that furnish substantial employment in the U. S.

They'll be out in full strength when U. S. delegates sit down at Torquay, England, Sept. 28, with representatives of some 40 countries to renew existing reciprocal trade agreements or to enter into new arrangements with new participants in the program. Union representatives will participate actively in the public hearings. Management and interested parties will also express their views.

The AFL already has mapped out a philosophy. It is the sponsor of the so-called National Labor-Management Council on Foreign Trade Policy, founded by Matthew Woll and chairmanned by O. R. Strackbein. It takes care of a tariff policy for AFL craft unions and their employers. So far, the council includes these industries: Book manufacturing, fishery, fish canning, glass containers, pressed and blown glassware, glove manufacture, fur, felt and wool hats, kaolin, matches, photoengraving, pottery, scientific apparatus, wall paper, aluminum and hot-house vegetables.

At a meeting in Washington on Mar. 22, Mr. Strackbein told the group that the organization views the Marshall Plan as a benefit, so

that all the people should pay for it. But he did not want to go to the extent of placing such burdens on "certain American industries that would throw their employees out of work." The council voted a demand for "reasonable safeguards against unfair and deflationary foreign competition."

In the meantime, the Trade Agreements Committee, chairmanned by Carl D. Corse, State Department, is preparing a list of commodities on which concessions will be considered. It will be a long list, publicized by the White House sometime prior to Apr. 30 along with the announcements about when the public hearings will be held.

The hearings are to be held by the Committee for Reciprocity Information, of which Lynn R. Edminster of the Tariff Commission is chairman. The hearings will have to be gotten out of the way at latest by June 30 to permit the Trade Agreements Committee to revise its ideas on concessions in the light of the views expressed at the hearings. The committee will need time to get organized for the Torquay meeting.

Day in Court—The plans call for at least five simultaneous hearings at different spots in Washington. That arrangement will be necessary since the commodities to be considered fall into 15 schedules, all of which are of great interest. The hearings, it is expected, will have to be continued for at least four weeks to give all witnesses their day in court.

Readers of STEEL will be interested mainly in the hearings to be devoted to Schedule No. 3, which includes metals in all their forms—from ores to manufactured products.

Plumbing Probe Projected

Data that will be valuable to many manufacturers should result from an investigation of plumbing and heat undertaken by the National Bureau of Standards for the Housing and Home Finance Agency.

Aiming at reconciling different opinions about pipe sizes, stack requirements, traps, water seals, etc., the investigators should obtain accurate data on heat transfer through commonly used materials, develop data for the design of efficient smaller types of hand-fired coal-heating systems, and obtain data on the movement of air in dwellings to determine justifiable heat losses on the basis of adequate ventilation.

Supplementing the work of the bureau, the U. S. Public Health Service is to develop adequate low-cost sewage disposal facilities for dwellings in outlying urban areas, and the University of Illinois is to develop minimum requirements for safe and adequate plumbing systems.

Power Resources Surveyed

Probably the most comprehensive survey of power sources ever made is contained in a three-volume work covering studies financed by the Army Signal Corps.

The three volumes may be obtained for $29.65 from the Armour Research Foundation, Chicago, which prepared them. The title: "Survey of Power Sources." The first volume covers electromagnetic and thermoelectric generators, the second electrostatic and specialized types of generators, and the third covers prime movers. Such factors as noise and radio interference are discussed in detail. The third volume describes a novel "barrel engine" that offers special advantages in size per horsepower; it cites the closed-cycle piston air engine as a possible noiseless portable engine suitable for any type of solid, liquid or gaseous fuel. The third volume also devotes space to a consideration of wind and solar power as forms of energy likely to be suitable for portable equipment.

New CCC Purchase Program

About 1000 tons of galvanized steel sheets—600 of 18 gage, 300 of 12 or 14 gage and the remainder 16 and 24 gage—are involved in a new Commodity Credit Corp. purchase program that calls for about 2000 perforated steel floors and 2000 ventilating duct systems for use in the grain storage structures recently purchased by CCC.

You can obtain specifications by writing to CCC, Washington 25, D. C.

★★★★★★★★★★★CAPITAL COMPASS★★★★★★★★★★★

INDUSTRIALISTS on the Housing Research Advisory Committee, Housing and Home Finance Agency, include Ben Moreell, chairman, Jones & Laughlin Steel Corp., C. F. Rassweiler, vice president, Johns-Manville Sales Corp., New York, and Tyler S. Rogers, Owens-Corning-Fiberglas Corp., Toledo, O. First meeting of the committee will be held in Washington Apr. 17. Goal is lower costs of home building. . . .

CIO spokesmen advised the House Un-American Activities Committee to kill the anti-Communist bills it is considering. Thomas E. Harris, CIO assistant general counsel, said Communists are losing strength in this country and there is no occasion for legislation that would not only deny civil rights to Communists but would hazard the civil rights of everyone else . . .

Checkup on how the Munitions Board is getting along with its stockpiling of strategic and critical materials has been ordered by the House Armed Services Committee. It will be conducted by an eight-man subcommittee headed by Rep. Carl T. Durham (Dem., N. C.) . . .

Federal Trade Commissions new triumvirate—Chairman Mason, Carson and Mead—continues to expedite FTC business with a speed never before known in that body: Abandoning completely the old policy of allowing cases to hang in suspense for years, the commissioners have decided to clean up by June 30 all cases which are ready for decision.

Bill to increase federal highway aid to $570 million annually has been approved by the House Public Works Committee . . .

Possibilities of airplane landing strips made of plastic materials are being investigated by the Department of Defense; steel was the preferred landing mat material in World War II . . .

At India's request, John Van H. Dorr II, U. S. Geological Survey, reported at New Delhi to study mineral resources; this is under the Point Four program. Mr. Dorr recently completed mapping of iron and manganese resources in Brazil . . .

Dr. John K. Gustafson, consulting geologist, M. A. Hanna Co., Cleveland, has been made a member of the Atomic Energy Commission's Advisory Committee on Raw Materials.

Senate-House conferees on the National Science Foundation bill dropped the provision calling on the Federal Bureau of Investigation to pass on the loyalty of employees of the proposed foundation. The feature, so repugnant to scientists, was inserted by the House. Conferees agreed, instead, to require employees and scholarship winners to take the military oath of allegiance.

Readers of STEEL owning motion pictures of their manufacturing processes and willing to make them available for showing in Marshall Plan countries to increase productivity in western Europe should communicate with the Technical Assistance Division, Economic Cooperation Administration, 800 Connecticut Ave. N. W., Washington 25.

What Happens When ERP Ends in 1952?

More and more Europeans are asking that question now that the program is about half over. Goals have been reached in production, but not in economic unity

LE PLAN, c'est magnifique, mais apres 1952, quoi? No matter what language they use, Western Europeans are asking: "The Marshall Plan is magnificent, but what happens when it ends June 30, 1952?"

Nobody yet can tell for sure, even though the ECA program is about half over. All you can do is see what has happened thus far in the two years the plan has been in force and make your guesses.

In the Black—From a production standpoint, the record is good.

Industrial output for all Marshall Plan countries in 1949 was 15 per cent above the 1938 level. Excluding Western Germany, it was 29 per cent in excess of prewar. For the last quarter of 1949, industrial production was at a rate 20 per cent greater than prewar. Steel output increased during each year of the program. Production for 1949 totaled about 50.6 million net tons, 17 per cent more than in 1948.

Coal production totaled 477 million tons in 1949, compared with 438 million tons in 1948.

Electricity output increased from 13.6 billion kwhr in 1947 to 16.5 billion kwhr in 1949.

Motor vehicle production in 1949 was 21 per cent above prewar. Output for the last quarter of 1949 was almost 50 per cent greater than for the corresponding 1948 quarter.

Volume of intra-European trade improved in 1949 over 1948, and the volume of trade of participating countries with the rest of the world also increased.

In the Red—But not everything is going as well as industrial production.

Despite high output, unemployment is rising, particularly in Italy, Western Germany, Belgium and Greece. The population of all participating countries rose 9 per cent over 1938, ranging from 1 per cent for France to 19 per cent for Western Germany.

European economic unification is far away. The payment union proposed by ECA as an intermediary step to aid unity is meeting with strong opposition even in the U. S. The Treasury Department is dubious about its benefits.

The dollar gap in trade between Marshall Plan countries and the U. S. has been narrowed but not closed.

The U. S. has spent nearly $9 billion on foreign aid in the past two years. Such a sum is bound to do good.

Europeans say they need $5 billion more in American aid before the program ends. They are not likely to get that much.

In the Middle—From present evidence, you can guess that by mid-1952 unemployment will be more serious than it is now, that economic unity will be as distant as it is now, that the dollar gap will about be closed and that industrial production will be leveling off. That's a partial recovery. Is it acceptable to most Western Europeans? Oui et non. Is it acceptable to most Americans? Yes.

Steel Ingot Capacity Rising

When the Marshall Plan is finished, it will have helped boost Western Europe's steel ingot capacity from 44 million net tons a year to 52.2 million tons. French capacity will be up by 2.2 million tons; the United Kingdom's by 5.5 million.

Thus far, 21 major steel expansion projects in Europe have received $167 million in American aid. Another $544 million in funds has been supplied from European sources. Much of the modernization is designed to lower costs rather than increase output. Four iron ore mining projects—one each in Austria, Norway, France and Turkey—are being mechanized at an overall cost of $43 million, including ECA financing of nearly $12 million.

The European steel industry relies on Lorraine ore and Ruhr coal, the iron ore and coal deposists of England, the rich iron ore deposits of Norway and Sweden and iron ore from Africa and the Mediterranean area.

Europe's Coal Supplies Better

Western Europe will produce 528.7 million net tons of coal in 1950, ECA estimates. That's slightly above the prewar level and will go far toward solving the area's coal shortage.

Leading producer is the United Kingdom, mining about 240 million tons yearly. Second is Western Germany that has a capacity of 139 million tons annually. Third is France and the Saar, producing 75 million tons each year. Marshall Plan countries imported 40.7 million tons of coal from the U. S. in 1947; by last year that had dropped to about 10 million tons.

ECA has approved funds in the

Wide World

CHASSISLESS: Among the types of British cars to be seen at the British auto exhibition in New York this week is this Morris Minor. Here it is seen parked opposite Cleopatra's Needle (left). Every effort was made to keep the weight of the small car down. It has a chassisless construction: The body serves the dual role or supporting the mechanical parts of the auto and the occupants (in this case the young lady outside). All seats are within the wheelbase

last two years for coal production projects in Turkey, Italy and Greece. Technical assistance projects have been approved for Denmark, the U.K., France, Turkey and Greece. A total equivalent to nearly $300 million in counterpart funds—foreign currency deposited by ERP nations to match ECA dollar grants—has been released to aid coal mine development in Europe.

In Turkey, ECA is financing two production projects—one for the Zonguldak area on the Black Sea and another to expand lignite output in western Turkey. Besides mine rehabilitation, harbor improvements, contruction of two washing plants and rail improvements will boost Zonguldak production to 40.9 million tons annually, compared with the current output of 28.1 million tons. Western Turkey's lignite capacity will be boosted from 440,000 tons annually to 1,250,000 tons in 1952.

ECA's project for Italy is in the Sardinian coal fields. Production there will be boosted from the current rate of 1.1 million tons per year to 3.3 million by 1952. At least 50 per cent of the coal will be consumed in thermal power plants now under construction.

Greece's project involves lignite mines.

Major coal expansion programs being financed by counterpart funds are in France. More than $220 million is being used to rehabilitate French mines, to build mine-connected power plants and coke plants.

More Power for Europe

More than $423.3 million in counterpart funds has helped increase Western Europe's electrical output to 65 per cent above prewar. Power is no longer severely rationed.

Four countries that have used counterpart funds for power projects have boosted their combined electrical output more than 22 billion kwhr since before the war. France, where the largest power expansion program is underway, withdrew the equivalent of $371.2 million; Austria, the equivalent of $18.8 million; and Greece, the equivalent of $100,000.

France will boost her electrical output to 43 billion kwhr by 1953, compared with the present production of 33 billion kwhr. That's being done with 58 new hydroelectric plants, 19 thermal plants and a series of dams across the Rhone river.

Although West German power output has risen from 29.4 million kwhr in 1938 to 35 million annually now, the production still is not enough. Of 48 new power projects, 20 will be completed this year.

Power in Austria has increased more than 190 per cent since 1938. Before the war she generated 1.9 million kwhr of electricity. This year, she'll produce 5.5 million kwhr.

Greek power output has also nearly doubled since before the war. Estimated production this year will be 535,000 kwhr.

LINGUISTIC LIBRARIAN
. . . except Japanese and Chinese

Aid to Export Trade

American Standards Association's library may be able to help you on foreign standards

EUGENE SOMOFF can give you specifications for filter clay for Venezuelan oil refining service, French safety codes that affect the design of a machine, British finger ring sizes translated into standard sizes used in the United States or answers to hundreds of other questions on standards plaguing American exporters.

Versatile Engineer—Mr. Somoff is a technical service engineer at American Standards Association's library of some 50,000 domestic and foreign standards in New York. He can translate all foreign language standards except Chinese and Japanese.

ASA has files including 7000 German, 3000 French and 2000 British standards, as well as the important codes for most other foreign countries.

Information from ASA on foreign standards is supplied by telephone, mail, sale of copies of the standards and sale of photostats. Although the ASA service does not include complete translations, questions are answered on whether there is a standards on a given subject, what the general content is and what certain details are. When required, copies of standards may be provided for further translation.

Silent Salesman—Why should U. S. industry bother with foreign standards? Because the total value of American exports was slightly more than $1 billion per month in 1948 and 1949.

Total exports of industrial and other machinery in 1948 were worth $1783 million. The automotive industry exported production worth $1564 million. Exported steel mill products and apparatus were worth $862 million. Industrial chemicals worth $293.1 million were exported.

ASA has information on dimensions for interchangeability of parts or equipment, specifications of materials and method of test, definitions of technical terms used in industry, industrial and public safety and health codes, building code standards and specifications for consumer goods sold in retail stores. ASA, 70 E. 45th St., New York, welcomes clear, relevant questions from American exporters.

Venezuelan Trade Threatened

Existing free trade relations between United States and Venezuela would be seriously impaired by higher tariffs or any restrictions on oil imports. This is the opinion of a delegation of Venezuelan industrialists in Pittsburgh last week as part of a "good neighbor" tour to encourage continuance of free trade.

Controls on oil, Venezuela's largest export to United States, will force the South American country to seek other markets, Eugenio Mendoza, importer and director of several leading firms in Venezuela, states. Thus American industry would lose part of the profitable Venezuelan market.

Venezuela exports 40 per cent of all its products to the United States, and 90 per cent of that is oil; 73 per cent of her imports, or $514 million worth in 1949, came from the United States.

Exports to Italy May Rise

American manufacturers expect to sell $60 million to $100 million worth of machinery and equipment to Italy in 1950, to equal or exceed the high volume exported to that country last year.

Machinery needs include heavy apparatus for cement mills, steel mills, metalworking plants fabricating finished products, power plants and oil refineries and gas works.

the New Arithmetic in Steel

Make each ton of steel go farther. Get four products in place of three from the same amount of steel. Let the high physical properties of N-A-X HIGH-TENSILE take the place of mass in your product design to boost production per ton as much as 33%. This new efficiency in the use of steel is part of industry's constant search for better materials.

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Thus you can redesign many steel products with sections 25% thinner—to save weight, save steel. And further savings in fabricating and finishing pay the way to use of this better, more efficient material.

Let us talk over with you the application of N-A-X HIGH-TENSILE to your product. We believe we can show you how to increase production per ton as much as 33%.

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By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

Nash departs from custom. In developing Rambler passenger car it started with simplest forms of motor transportation and built upward rather than stripping down full-size auto

DETROIT

OUT in the garage of the Nash administration building here is an unusual and interesting assortment of motor bikes, motor scooters, motorcycles and small passenger cars of foreign and U. S. makes. All are in operating condition. They represent the breeding ground on which the new Nash Rambler took shape.

Rather than start with a full-size automobile and strip it down gradually to the desired weight and price class, it was decided to reverse the process and start with the simplest forms of motorized transportation, working up to the final concept. The process took about five years, plus expenditure of $13 million.

Less Expensive—For several weeks now, the first of the new Rambler series, a custom convertible, with full deluxe appointments, has been in production. Eventually it will be followed by a station wagon, a two-door sedan and other versions in a lower priced range. The idea of first presenting the most elaborate and deluxe type in a model series also is an unusual technique, but Nash figures that by so doing it will create the least disturbance to its two larger lines, the Statesman and Ambassador, and eventually, as the matter of price becomes more critical, there will be a number of less expensive designs in the Rambler group to offer.

Introduction of the Rambler marks the start of Nash Motor's 49th year of automobile manufacture and revives one of the most famous names in bicycle and automobile history. The first Rambler car, built in what is the present Nash plant at Kenosha, Wis., was introduced in 1902 and was one of the country's first mass-produced vehicles, 1500 being turned out in a single year.

Built-in Safety—The convertible design represents a completely new construction system, combining much of the safety of an all-steel sedan with the recreational advantages of an open car. Overhead safety protection is accomplished with two heavy steel side rails framing the top of the side windows. An integral part of the body, these overhead chrome-trimmed rails also form a structural bridge-beam for extra body rigidity. They also carry the built-in tracks for the electrically operated fabric top and serve as a frame for the side windows. Electric driving mechanism of the top, positioned behind the back of the rear seat, operates aircraft-type nylon-coated steel cables, attached to the top for pushbutton control through a reversible-type electric motor. Flexible plastic rear window folds down without damage and can be removed entirely by means of a zipper closure.

Lower and lighter than previous models, the convertible stands 59¾ inches high. Road clearance, seat height and entering height are about the same as other Nash models. Wheelbase is 100 inches, overall length 176 inches, front tread 53½ inches, rear tread 52 inches, shipping weight 2400 pounds. The front seat accommodates three, the rear seat two. Back of the front seat is split off-center on the driver's side.

No Vertical Loads—Front suspension is novel for U. S. design. Coil springs are not connected midway on the lower control arms, but instead are installed between the top of the steering knuckle and a high point of the body structure, just inside and above the front wheels. In this location the springs take nearly direct wheel loads and shocks, the front suspension linkage is called upon to maintain wheel alignment and take side thrusts. The lower control arms no longer are subjected to vertical and bending loads and can be made lighter, with less unsprung weight.

Another advantage is that it is not necessary to insulate the control arms from the body, as they no longer transmit vertical loads. Coil springs, being located nearer the wheels, can be lighter and more flexible due to greater vertical travel at this point.

Ample power and acceleration are provided by using the basic L-head engine design of the 1949 model in the 600 series. Power rating of the 6-cylinder engine is 82 horsepower, 3¾ inch bore and stroke, 172.6 cubic inch displacement. Fuel economy is estimated at 30 miles per gallon or better, without overdrive which may be specified if desired.

No Exposure—A new arrangement

RAMBLER: Fabric top of the new Nash Rambler convertible is powered by a reversible electric motor geared to a spiral grooved drum formed to fit the nylon covered cables that are connected with the top mechanism. The motor is inside the rear passenger compartment behind the rear seat. Passengers are afforded overhead safety protection by two heavy steel rails above the doors. Wrap-around bumpers and frontal view point up road-hugging width

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has been worked out for steering wheel, controls and instruments: All are built as one compact unit forward of the driver. There is no exposed steering column, the wheel being mounted directly at the instrument panel. Gearshift and directional turn levers also are mounted in the dash panel.

An unusual latching mechanism is used to secure top at the windshield header. To avoid strain at the header and to facilitate latching and unlatching of the header clamps, the top header is provided at each end with plate hooks which automatically engage with pins in the top rails. These hooks provide the tension necessary to keep the top taut and smooth. The only function of the clamps on the leading edge of the top is to bring the ends securely down on the windshield header. Four pressed steel crossbows ride in the top rails and support the top fabric.

An unusual design touch is the provision of small chromed ventilators on either side of the cowl at the point where the hood meets the front fenders. Nash engineers declare frankly they don't know whether air will flow in or out of these vents but they are going to be interested in learning public reaction to them. So far as is known, no other passenger car has made use of such an arrangement.

Warm Praise—Those who have seen and driven the Rambler convertible are warm in their praise of the careful engineering and styling which has gone into its design. They are in every sense up to the full measure of the finest full-size passenger cars. There may be some complaints heard on the score of headroom from taller drivers, or the lack of storage space in the rear deck, since the top-actuating mechanism takes a lot of the available space here, but obviously a car in this size, weight and economy range cannot have everything. Somewhere compromises are necessary.

Nash thinks it may be able to boost its 1950 production 50 per cent beyond 1949 total, with the added impetus of the Rambler series. Already the first quarter of the year has set a new assembly record at nearly 49,000 cars, and only a few of these were the small job. Much will depend upon easing of steel supplies.

Envious of Steel Stocks

Smaller users of steel, such as job stamping plants, unable to realize positions on mill books which would yield them enough material to keep up with orders or to utilize even a good share of productive capacity, perhaps can be pardoned their jealous looks at mountainous quantities of sheet and strip pouring into automotive plants. Even strikebound Chrysler plants have been warehousing large tonnages in the hope of pushing car and truck production up to record levels without delay.

The case of one medium-size stamping plant in this area is typical. Currently this shop is operating at 10 per cent of capacity because of lack of steel, despite the fact its representatives daily are scouring the territory for material. The difficulty springs from the fact the company has no prewar pattern of steel buying, having been organized about the time the war started. During the war years, ample material was forthcoming on government priority for aircraft and ordnance work, but since then supplies virtually have dried up, so much so in fact that the management is seriously considering "turning the key in the door" and liquidating the business.

The company has literally dozens of new ideas for steel stampings, and promises of orders running into the millions—but no steel. It has not even been found possible to persuade mill salesmen to visit the plant to discuss requirements, with one exception where a mill dispatches a salesman to return orders. Here is a case where a few hundred tons of sheet and strip a month would keep a flourishing business alive, and it might be wondered whether mill sources are not being a trifle shortsighted in refusing to give any consideration to fabricators who have no prewar pattern of buying. If for no other reason than good public relations it would appear justifiable to allocate a little tonnage to distressed users of this sort. And there are dozens of them throughout the country. When the supply picture eases, mill salesmen are going to find it difficult even to talk business with these firms, if they manage to hold out until then.

Auto, Truck Output

U. S. and Canada

	1950	1949
January	610,211	445,092
February	504,954	443,734
March	613,000*	543,711
April		569,728
May		508,101
June		623,689
July		604,351
August		678,092
September		657,073
October		601,021
November		474,731
December		384,318
Total		6,533,641

Weekly Estimates

Week Ended	1950	1949
March 25	140,196	121,341
April 1	139,821	119,088
April 8	139,600	131,870
April 15	140,000	131,821

Estimates by Ward's Automotive Reports
* Preliminary.

New Records for New Cars

Final checks on March passenger car sales have been accompanied by a flock of new records. Olds dealers delivered 36,105, or 1000 better than the previous mark of April, 1941. Buick sold 54,993, the first time in the division's 47-year history that sales for a single month passed 50,000. The figure was 79 per cent over March, 1941.

Ford's production for the month established a 20-year high and almost daily set new postwar records. With the aid of some overtime and Saturday work, the company turned out 172,967 cars and trucks for the best month since August, 1929. The accelerated pace is expected to continue through the first half. Tractors likewise are keeping pace, production for the first quarter amounting to 26,228, and and schedules for the second quarter set at 27,045. Chevrolet sales of cars and trucks in March also shattered alltime marks, at 163,406 units, and dealers generally report demand still unsatisfied.

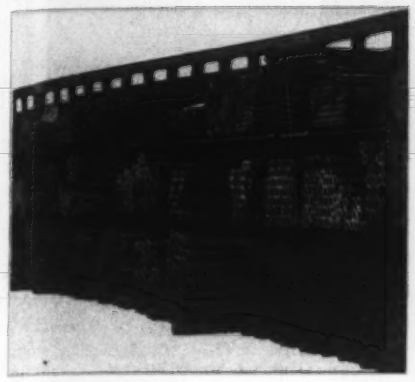
Fisher Body Expands Plant

Stamping plant of Fisher Body Division at Grand Rapids is being expanded by 189,000 sq ft and its employment will be boosted by 200. Present truck wells will be relocated and an additional 600 feet of double-track railroad siding will be built, along with a new parking lot for employees.

Build Hudsons in Canada Again

Suspended because of the war, Hudson assembly operations in Canada resumed Apr. 5 in Tilbury, Ont., at the plant of Chatco Steel Products Ltd. First started in 1932, Hudson assemblies will mean a 30 per cent increase in employment at the plant, initial output being confined to the lower-price Pacemaker model. Sales since 1946 have been on an import basis. About 50,000 Hudsons are now operated in the Dominion.

Now! Immediate delivery of two TIMKEN® steels that will do 90% of your hollow-parts jobs!



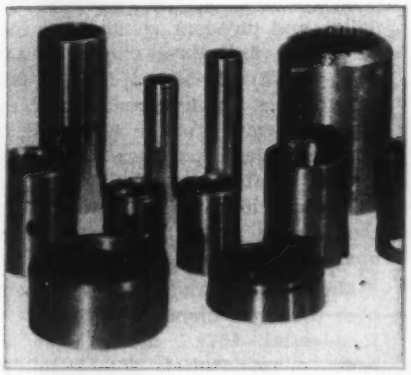
52100 TUBING
101 STOCK SIZES

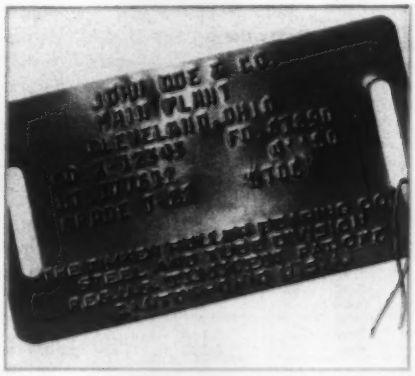
"NICKEL MOLY" TUBING
52 STOCK SIZES

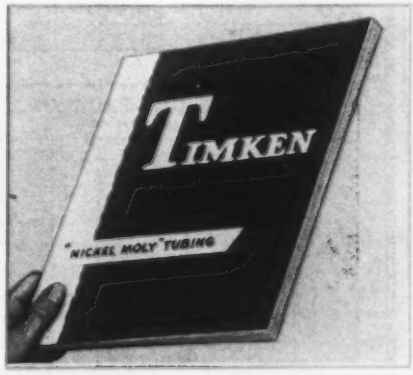
1 WAREHOUSE LOTS of Timken® 52100 and Timken "Nickel-moly" tubing can be shipped within 24 hours of receipt of order. These two steels will do 90% of your hollow-parts jobs.

2 TIMKEN 52100 tubing is a high carbon chrome, direct quenching steel that has through hardenability in moderate sections. Available in 101 sizes, from 1″ to 10½″ O. D.

3 TIMKEN "NICKEL-MOLY" tubing is a low carbon, carburizing steel that develops high surface hardness and a tough inner core. 52 sizes available, from 1.389″ to 10.223″ O. D.







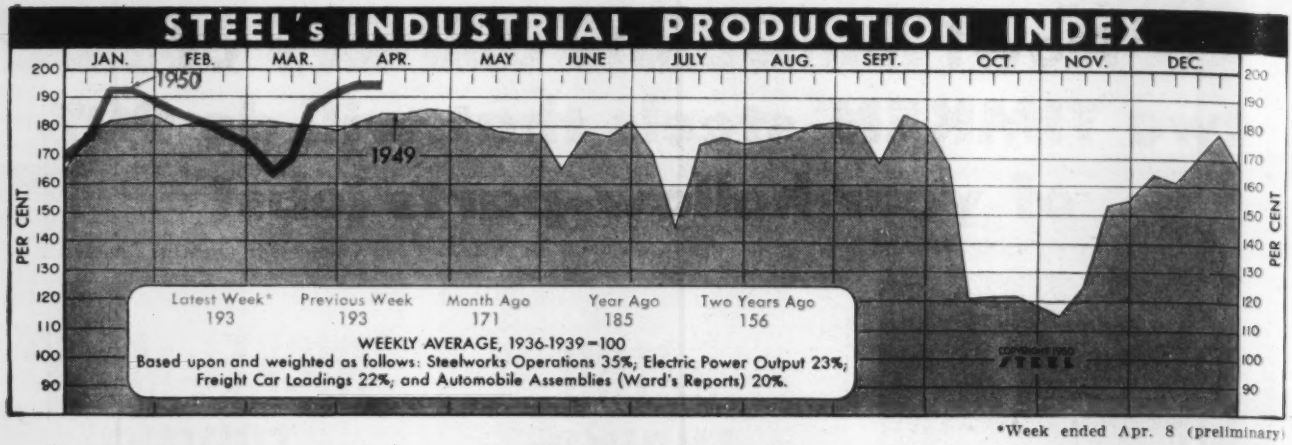
4 THESE TWO STEELS offer good hardenability and wear resistance for hollow parts like: collets, bushings, spindles, sleeves, pump parts, slitter knives, piston pins and many others.

5 YOU CAN DEPEND ON uniform, high quality in *every* shipment of Timken tubing—thanks to The Timken Company's rigid, complete quality control from melt shop through final inspection.

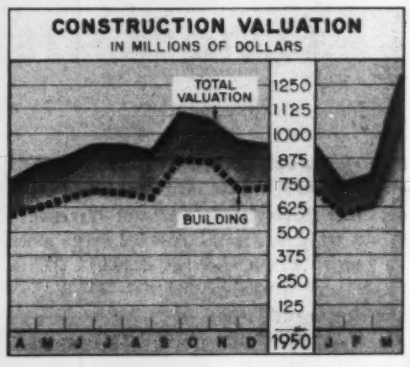
6 WRITE TODAY for Timken 52100 and Timken "Nickel-moly" stock lists to The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO."

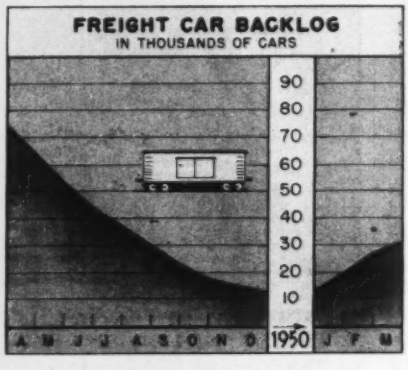
YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

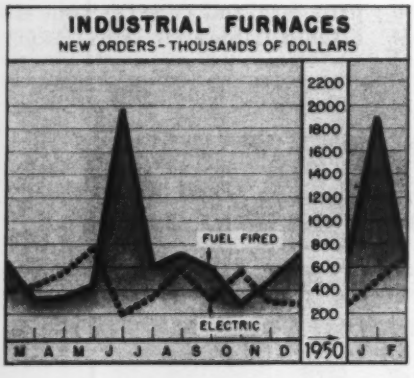
Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1950
1949
PER CENT
Latest Week* 193
Previous Week 193
Month Ago 171
Year Ago 185
Two Years Ago 156
WEEKLY AVERAGE, 1936-1939=100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.

*Week ended Apr. 8 (preliminary)







Charts—Copyright 1950, STEEL

Construction Valuation

(37 States)—In Millions of Dollars

	Total		Building	
	1950	1949	1950	1949
Jan.	730.9	483.0	578.8	381.0
Feb.	779.5	568.5	627.0	415.0
Mar.	1,300.2	747.6	1,075.3	579.2
Apr.	....	842.6	....	620.2
May	....	880.3	....	666.9
June	....	945.7	....	706.7
July	....	943.6	....	690.9
Aug.	....	905.7	....	671.5
Sept.	....	1,093.7	....	870.6
Oct.	....	1,061.8	....	857.8
Nov.	....	957.8	....	701.3
Dec.	....	929.0	....	722.2
Total	....	10,359.3	....	7,883.3

F. W. Dodge Corp.

Freight Car Awards and Backlogs

	Awards		Backlogs*	
	1950	1949	1950	1949
Jan.	9,385	1,663	19,026	96,214
Feb.	9,075	332	26,055	85,974
Mar.	6,201	199	30,359	73,188
Apr.	....	30	.....	62,569
May	....	589	.....	52,281
June	....	153	.....	42,813
July	....	408	.....	36,564
Aug.	....	185	.....	28,731
Sept.	....	123	.....	22,203
Oct.	....	201	.....	17,377
Nov.	....	1,145	.....	14,146
Dec.	....	1,220	.....	12,036
Total	....	6,248		

*End of month.

American Railway Car Institute

Industrial Furnaces

New Orders—Thousands of Dollars

	Fuel Fired*		Electric	
	1950	1949	1950	1949
Jan.	1,914	1,047	473	948
Feb.	616	636	697	402
Mar.	....	305	...	436
Apr.	....	322	...	543
May	....	438	...	762
June	....	1,978	...	196
July	....	594	...	329
Aug.	....	706	...	589
Sept.	....	589	...	318
Oct.	....	269	...	565
Nov.	....	464	...	293
Dec.	....	718	...	281

* Except for hot rolling steel.
Industrial Furnace Mfrs. Assn.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Constr. Valuation..Mar.20	Ind. Prod. Index..Apr.10	Ranges, Gas Jan.2
Durable Goods Mar.27	Machine Tools Mar.27	Refrigerators, Elec..Mar.27
Employ., Metalwkg:Mar.20	Malleable Cast. Mar.27	Steel Castings Feb.27
Forgings, Steel....Apr.3	Price Indexes Apr.3	Steel Shipments ...Apr.10
Fab. Struc. Steel..Apr.10	Pumps, Orders Apr.3	Trucks, Elec. Ind...Jan.2
Furnaces, W. Air...Jan.2	Purchasing Power..Apr.10	Vacuum Cleaners...Apr.3
Gray Iron Cast. ..Apr.10	Ranges, Electric ..Mar.27	Wages, Metalwkg. .Mar.20
Gear Sales Apr.3	Radio, Television ..Mar.27	Washers Apr.10

Construction Sets Alltime High

An alltime high for monthly construction volume was set in March in the 37 states east of the Rocky mountains. The latest total compiled by F. W. Dodge Corp. is $1,300,201,000, topping the former mark of $1,190,264,000 reached in June, 1942, by a comfortable margin. March's total was 67 per cent higher than February's and 74 per cent greater than in March, 1949.

A new first quarter record in both dollar and physical volume was also set in the first three months of this year. Contracts awarded in the first quarter for building and heavy engineering works totaled $2,810,586,000 and provided for more than 245 million sq ft of new building space. The three months total was 56 per cent higher than the preceding first quarter record posted in 1949.

March totals and percentage gains over the same month last year were: Residential, $574.7 million, 128 per cent; nonresidential, $500.7 million, 53 per cent; and heavy engineering, $224.9 million, 34 per cent.

Freight Car Backlogs Rise

Freight car backlogs continued to grow in March but new orders were down. March orders totaled 6201, compared with 9075 in February. American Railway Car Institute reports 2271 were placed with car builders and 3930 with railroad shops. Backlog of orders on Apr. 1 was: Car builders, 12,104; railroad shops, 18,435; total, 30,539. This compares with 26,055 on Mar. 1 and 73,129 on Apr. 1, 1949.

Deliveries during March totaled 1712, declining from February deliveries of 2046. A year ago during the freight car building peak 11,910 freight cars were delivered. Production of the leading types of cars was: Box, 169; hopper, 293; flat, 916; gondola, 210; refrigerator, 32; tank, 87.

The Business Trend

Although there are reasons for optimism in the current metalworking picture, strong competition and upward price pressures won't allow you to relax

LOOK at the industrial picture — there is much to cheer you. Few metalworking companies are anything but optimistic, even if some of this optimism wears a cloak of caution.

In recent weeks the level of metalworking activity has moved up to alltime weekly highs. Even the "weak sisters" are doing better. But it's not a time when you can relax. Competition is intense and there is always the specter of rising costs in the background. If you can cut costs and market your product for a little less than the other fellow, you will probably have a good year in 1950.

Production . . .

For the second consecutive week industrial production remained at the alltime weekly high. In the week ended the index stayed at 193 per cent (preliminary) of the 1936-1939 average. A small gain in steelmaking was counterbalanced by lower electric power output and freight carloadings. Until Chrysler returns to action and adds the weight of its automobile assemblies to total metalworking output, it is unlikely the index will rise much higher. Electric energy distributed usually attains its peak in the winter months and freight car loadings will show the effects of easing in coal mining.

Automobiles . . .

Except for Chrysler the industry is doing better than expected. Outturn hovers around the 140,000 level and sales are said to be matching or exceeding production. The rapid pace in passenger car assemblies bears out earlier forecasts but truck production and sales are surprisingly strong. Truck makers don't want to jinx themselves by saying so but their business is booming. The light truck market is holding up better than expected and even heavy-duty trucks are in strong demand. March production is estimated at 109,500 units, the best volume since the same 1949 month. April's aggregate will be down to about 101,000 because of fewer work-days but that is a 15 per cent increase in the daily assembly rate. Lack of essential components, resulting from strike induced shortages, plagues all the high volume truck producers.

Steelmaking . . .

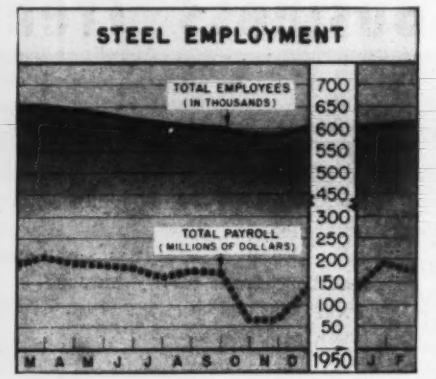
Steelmaking furnaces last week were estimated to be operating at the highest rate since the week ended Mar. 14, 1949, when the weekly record was set. Percentagewise operations were at a lower level but they are based on a higher capacity. Weekly capacity in 1950 is 1,906,267 net tons, compared with 1,843,516 tons in 1949. In the week ended Apr. 8 output of steel for ingots and castings was at 97.5 per cent of capacity.

Inventories . . .

Commerce Department reports business inventories fell about $100 million in February from January levels after allowing for seasonal factors. Before adjustment, inventories

BAROMETERS of BUSINESS

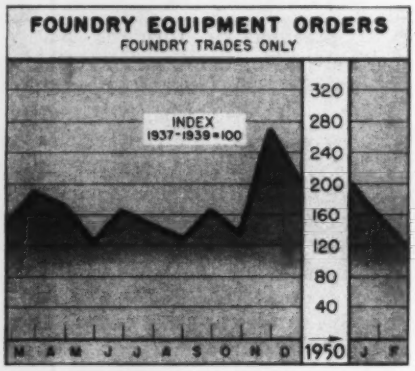
		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	97.5	97.0	73.0	98.5
	Electric Power Distributed (million kilowatt hours)	5,898	5,912	5,937	5,360
	Bituminous Coal Production (daily av.—1000 tons)	1,967	2,062	513	1,656
	Petroleum Production (daily av.—1000 bbl.)	4,998	4,873	4,827	4,974
	Construction Volume (ENR—Unit $1,000,000)	$304.4	$258.9	$210.6	$178.2
	Automobile and Truck Output (Ward's—number units)	139,600	139,821	124,563	132,240
	*Dates on request. †1950 weekly capacity is 1,906,267 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (Unit—1000 cars)	705†	720	708	758
	Business Failures (Dun & Bradstreet, number)	203	198	221	230
	Money in Circulation (in millions of dollars)‡	$27,133	$26,969	$27,105	$27,514
	Department Store Sales (changes from like wk. a yr. ago)‡	none	+1%	none	+7%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$14,329	$13,265	$13,258	$13,583
	Federal Gross Debt (billions)	$255.6	$255.7	$255.9	$251.5
	Bond Volume, NYSE (millions)	$20.3	$21.5	$20.5	$16.9
	Stocks Sales, NYSE (thousands of shares)	8,110	10,746	7,532	4,834
	Loans and Investments (billions)†	$66.6	$67.0	$66.8	$61.2
	United States Gov't. Obligations Held (millions)†	$36,118	$36,702	$36,774	$31,750
	†Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	156.13	156.13	156.13	154.01
	STEEL's Nonferrous Metal Composite‡	157.8	157.4	158.5	209.4
	All Commodities†	152.0	152.1	152.0	158.0
	Metals and Metal Products†	169.6	169.6	169.3	173.3
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				



Steel Employment, Payrolls

	Employees in Thousands		Payrolls in Millions	
	1950	1949	1950	1949
Jan.	609	650	$189.3	$202.1
Feb.	613	653	174.7	189.8
Mar.	....	652	....	207.2
Apr.	....	647	....	191.9
May	....	637	....	188.4
June	....	625	....	181.8
July	....	610	....	160.3
Aug.	....	603	....	175.6
Sept.	....	600	....	173.5
*Oct.	....	584	....	63.1
*Nov.	....	584	....	63.1
Dec.	....	602	....	136.9

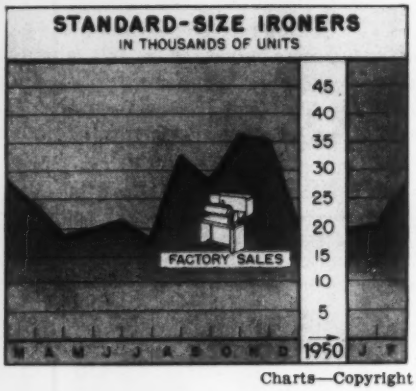
Monthly average. * Averages taken from single figure for the two strike affected months. American Iron & Steel Institute.



Foundry Equipment Orders

	Index		Value in Thousands	
	1950	1949	1950	1949
Jan.	159.3	149.9	$731	$694
Feb.	113.1	144.4	519	668
Mar.	....	190.8	....	883
Apr.	....	172.0	....	797
May	....	121.9	....	565
June	....	164.9	....	764
July	....	146.6	....	679
Aug.	....	127.1	....	589
Sept.	....	166.6	....	772
Oct.	....	133.5	....	618
Nov.	....	270.4	....	1,250
Dec.	....	201.0	....	929

Foundry Equipment Mfrs. Assoc.



Standard-Size Ironers

Factory Sales—Units

	1950	1949	1948
Jan.	20,300	28,300	40,192
Feb.	27,600	28,400	51,651
Mar.	.....	23,800	53,686
Apr.	.....	18,100	47,319
May	.....	19,500	44,954
June	.....	21,100	32,767
July	.....	17,700	26,679
Aug.	.....	32,300	35,203
Sept.	.....	27,700	37,308
Oct.	.....	36,045	38,517
Nov.	.....	35,000	42,000
Dec.	.....	19,400	26,000
Totals ..		307,345	476,860

American Washer & Ironer Mfrs. Assoc.

Charts—Copyright 1950, STEEL

at the end of the month were estimated at $54.2 billlon, compared with $53.8 billion at the end of January and $58.7 billion at the end of February, 1949. Most of the decline was concentrated in durable goods industries, particularly in motor vehicle stocks. Brisk sales and the Chrysler strike were major factors in the drop.

Railroads . . .

Net railway operating income of Class I Railroads in February plunged far below the total for the like month a year ago, says the Association of American Railroads. The aggregates were $15.2 million and $30.9 million, respectively, for February and the same month a year ago. Since net operating incomes are figured after payment of operating expenses and taxes but before interest, rentals and other fixed charges, Class I railroads had a $9 million deficit in February. In February, 1949, net income was $6 million.

Bituminous Coal . . .

Operations in the bituminous coal mines are slowing gradually as stockpiles grow. In the week ended Apr. 1, bituminous coal output eased to 11.9 million tons, a production drop of 500,000 tons from the preceding week and 1.5 million tons from two weeks earlier.

Consumers in Buying Mood

Uncertainty about future business conditions isn't dampening purchasing plans for durables

SALES prospects for metalworking companies making consumer durables are bright in 1950. Reinforcing the independent surveys made by many manufacturers, the Federal Reserve Board's semiannual nose counting should allay the fears of pessimists.

FRB's poll of buying intentions throughout the country shows consumers expect to buy about 1 million homes and twice as many television sets as they planned buying early last year.

Uncertainty No Damper — The board notes consumers now are more uncertain about business conditions than at the start of 1949. This uncertainty hasn't weakened their plans for buying houses, automobiles and other durable goods.

Demand for new automobiles may about equal that in 1949 when the auto industry set alltime marks in production and sales. This is an improvement in the forecasts advanced at the start of the year when the consensus was that sales would be down 10 to 15 per cent from the 1949 total.

Fewer Doodads Perhaps—A larger proportion of car buyers apparently will come from the middle and lower income groups, FRB says. Automobile manufacturers are aware of this fact and either have made available or are getting ready passenger cars stripped of much chrome and glitter.

The survey also shows demand for other durables about the same as last year. Here too, additional sales may result if models embodying high performance but lacking decorative features are used to entice customers' dollars out of storage.

Additional Help Needed

Heavy ordering in the first quarter makes it necessary for Frigidaire Division, General Motors Corp., to add 1500 employees at its Dayton, O., plant. The new employees will bring the payroll to more than 20,000 by the end of April, a peak figure for the GM division. In mid-March officials pegged employment at about 19,000 or 2000 above the number on the payroll in mid-1949.

First quarter sales set an alltime high for Frigidaire. March production and orders exceeded like totals for February, previously the record month. Orders in recent weeks are said to have been so heavy that the

factory has had to ration shipments of refrigerators and ranges and has been unable to fill orders on hand.

Frigidaire is also behind on shipments of ice cream cabinets, food freezers, washing machines. Air conditioning equipment sales also are bulking large.

Stainless Business Good

Order backlogs at Eastern Stainless Steel Corp.'s Baltimore plant and Cambridge, Mass., warehouse insure a well-rounded production schedule for several months, says John M. Curley, board chairman and president. During recent months sales at the Cambridge warehouse, operated by Industrial Steels Inc., a wholly owned subsidiary, have reached an alltime high.

Billings at the warehouse are expected to be close to $1 million in April, Mr. Curley adds, and that was considered good volume in wartime. April's mill shipments should equal the 1400 tons shipped in March. First quarter shipments were about 80 per cent higher than in 1949's fourth quarter. Operating profit, in the first quarter was about $500,000 before taxes on sales totaling $6 million, compared with a $301,337 profit on $4,054,350 in sales for the same period last year.

A change in stainless steel specifications for television picture tube cones will benefit Eastern, Mr. Curley explains, because the new specifications are more suited to the company's operations.

Best Output Since the War

Monthly tonnage of forgings now being produced at Kropp Forge Co., Chicago, is greater than at any time since the war, says Roy A. Kropp, president. The company does not foresee any quick drop in demand.

"Orders from the machine tool, aviation and automotive industries are particularly heavy and there has also been a marked increase in orders from railroads and government arsenals," Mr. Kropp reports. Orders have risen sharply in the last 60 days and incoming orders are exceeding production even with equipment operating at capacity.

GE Builds Big Radio System

General Electric Co. will build equipment for a micro-wave radio communications system to be used by Transcontinental Gas Pipe Line Corp. to operate and maintain its 1840-mile line under construction between Mercedes, Tex., and New York city. Dr. W.R.G. Baker, GE vice president, says the radio project will cost almost $1 million.

Steel Cabinets Move Up

Sales running ahead of like 1949 period in first quarter. Building brightens prospects

MOUNTING sales and backlogs point to a pretty good year for steel kitchen cabinet manufacturers. Nine out of twelve companies spotchecked report a good increase in the first quarter's volume of business over the like 1949 period. The other three companies show slight declines from year ago volume.

Several reasons are advanced for expected improvement over 1949 volume when sales of 2,625,000 units with a retail value of $103,687,500 were reported by the Steel Kitchen Cabinet Institute, Cleveland. Leading the list is the boom in building which will reach 1 million new homes this year on the basis of the semiannual Federal Reserve Board consumers' survey just completed. Many formerly hesitant buyers are being drawn into the market for homes after waiting in vain for real estate prices to break. New legislation will make it easier for many veterans to buy homes with mortgage payments extended to a 30-year maximum, thus reducing size of monthly payments.

Face-Lifting Helps—Home modernization will enlarge the existing market. In this area the government is making additional loan funds available to simplify home modernization.

Shortage in steel sheets as a result of strikes has hampered shipments by many manufacturers. This condition has contributed to steel kitchen cabinet makers' backlogs and means good business for several months to come.

Although this year's business for the steel cabinet industry should top 1949 totals in both units and retail value of sales, there is no disposition on the part of the industry to predict that the 1948 high will be topped. That year 3.5 million steel kitchen cabinets with a retail value of $138 million were sold.

Better Than Year Ago — Mullins Mfg. Corp., Salem, O., one of the largest manufacturers of kitchen cabinets, says its first quarter net profit was about $1.2 million compared with $746,051 in the corresponding 1949 period. The company reports its backlog to date is higher than at the end of the fourth quarter last year.

Chicago Area Expanding

Total plant outlays in the Chicago area for March and the first quarter were the highest of any postwar year.

The Chicago Association of Commerce & Industry gives the March and first quarter totals as $17.7 million and $70.9 million.

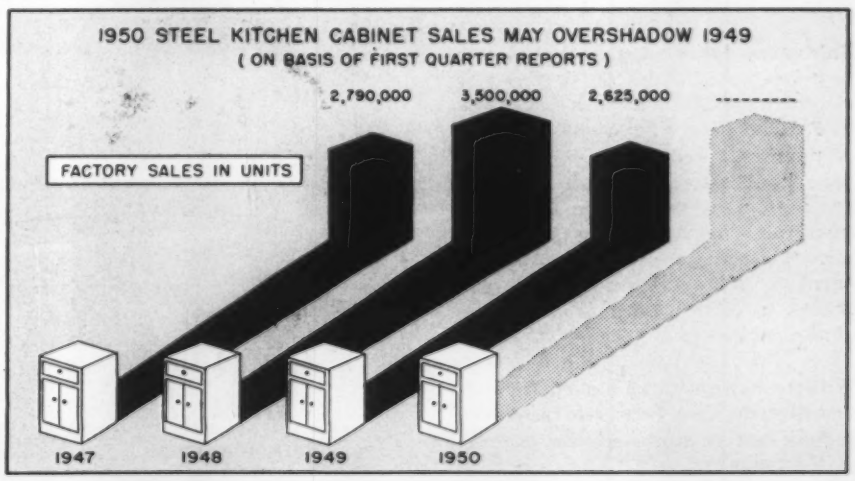
Expansion plans were announced in March by 32 companies, including four new to the area. The four new companies are: Caterpillar Tractor Co., Dulane Mfg. Co., Manifold Business Forms Inc. and Specialloy Inc.

Truck Tire Prices Go Up

Advance in first line truck tire prices effective Apr. 15 is announced by Seiberling Rubber Co., Akron. The 5 per cent increase follows similar action by other major tire producers.

J. P. Seiberling, company president, says an increase in tire prices before midsummer is inevitable. He explains the industry badly needs a price increase of at least 10 per cent because of higher manufacturing and distribution costs.

President Seiberling predicts that sales and earnings for his company will be greatly improved in 1950 now that tire buying has returned to normal seasonal patterns.



Men of Industry

WARREN L. SMITH
. . . elected president, M. W. Kellogg Co.

Warren L. Smith, former senior vice president, was elected president of **M. W. Kellogg Co.,** New York, subsidiary of Pullman Inc. He succeeds **Harold R. Austin,** retiring after 47 years' association with the company. Concurrently the executive staff was enlarged with **Bennett Archambault,** former treasurer, being elected vice president and general manager, a newly created post. Also named vice presidents are **G. Frank Bayes, Ronald B. Smith** and **Zary A. Toula.** Incumbent vice presidents were re-elected. **Daniel J. Olsen** was elected treasurer and comptroller, and **Edwin L. Gidley,** secretary. Mr. Austin will continue to serve the company as a consultant to the president.

—o—

Dana W. Atchley Jr. was appointed director of engineering of **Tracerlab Inc.,** Boston. He was sales manager since 1947. **William A. Kerr,** formerly with American Optical Co. in an executive sales capacity, was appointed general sales manager.

—o—

Fairbanks, Morse & Co. elected two new vice presidents. **O. O. Lewis** is vice president in charge of sales, and **F. J. Heaslip,** vice president in charge of purchases and traffic. Both men have been associated with the company for many years. Mr. Lewis has been sales manager since 1948, and Mr. Heaslip was made purchasing agent in 1935 and director of purchases in 1942. Both are directors of the company.

—o—

William A. Smith was named **Milwaukee Electric Tool Corp.** representative in four eastern states and the District of Columbia.

CARL M. RIEFKIN
. . . division general manager, Newport Steel

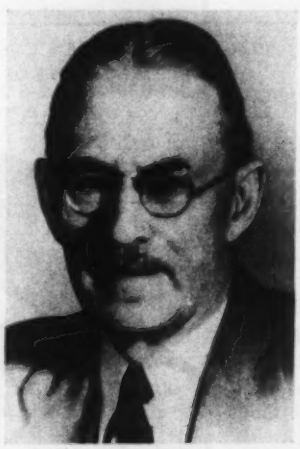
Carl M. Riefkin was appointed general manager, rolling mill division, **Newport Steel Corp.,** Newport, Ky. He has been associated with steel operations at Newport for 26 years. Prior to this appointment he was general manager of sales, and previously was advertising and sales promotion manager.

—o—

J. C. Redmond was elected president of **Transue & Williams Steel Forging Corp.,** Alliance, O., succeeding the late **J. R. Gorman. Emery Cook,** sales manager, will replace Mr. Redmond as vice president in charge of sales.

—o—

Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., appointed **E. T. Peterson** vice president, engineering. He has been associated with the company 27 years, recently as chief engineer in the rolling mill department.



E. T. PETERSON
. . . new Birdsboro vice president

JAMES L. SNAMAN
. . . sales manager at Pannier Corp.

James L. Snaman was appointed general sales manager for **Pannier Corp.,** Pittsburgh. He has been with the organization 14 years, and for the last two years was manager of its corrugated box rubber printing die division.

—o—

McDowell Co. Inc., Cleveland, appointed **W. N. Young,** formerly of Baltimore & Ohio Railroad, as chief engineer.

—o—

Herbert E. Cragin Jr. was promoted to assistant to the president in charge of engineering research and development, **Taylor-Wharton Iron & Steel Co.,** High Bridge, N. J. He is succeeded as plant manager of the High Bridge foundry by **Erwin H. Mebs,** formerly with Machined Steel Casting Co., Carnegie-Illinois Steel Corp., and Ohio Steel Foundry Co.

—o—

George H. West was appointed director of advertising and public relations and a member of the executive staff of **Consolidated Engineering Corp.,** Pasadena, Calif. With the company eight years he previously held the position of advertising manager under the jurisdiction of the sales department.

—o—

Richard A. Biggs was appointed director of architectural development for **Crucible Steel Co. of America,** New York. He formerly was development engineer of Pittsburgh Corning Corp., Pittsburgh.

—o—

Edwin F. Bates, formerly manager, Red Lion plant of **Budd Co.,** Philadelphia, was appointed manager of the company's Chase plant, now un-

SPEED NUTS® and SPEED CLIPS®

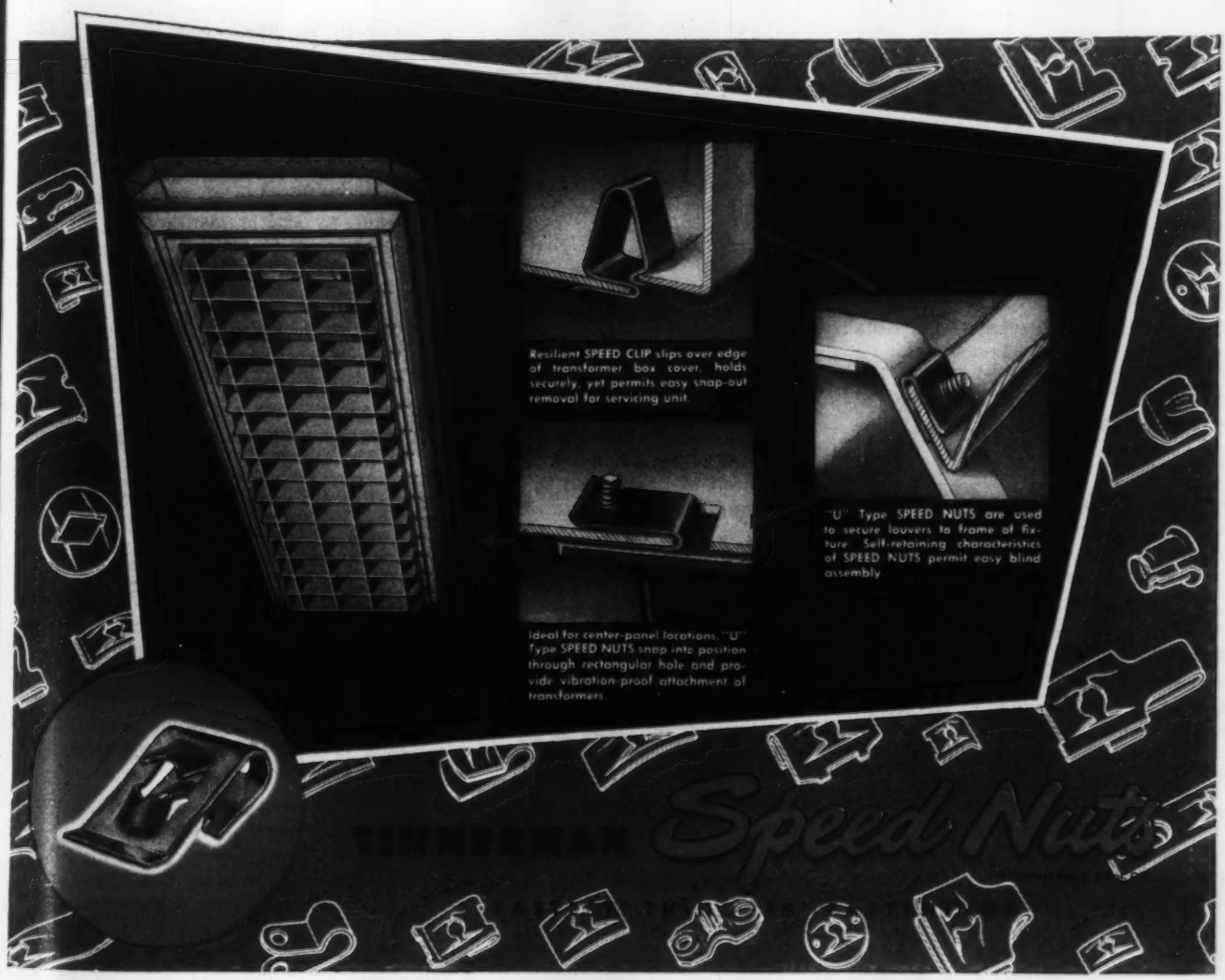
"Shed New Light"

ON LIGHTING FIXTURE ASSEMBLY COST

Here's how Tinnerman fasteners "lightened" cost burdens three ways for Joleco Corp., St. Louis manufacturers of fluorescent lighting fixtures.

1. A substantial assembly savings of $1.79 per unit was effected by switching to SPEED NUTS and SPEED CLIPS.
2. Because they are self-retaining, Tinnerman fasteners eliminated the need for investing thousands of dollars in new fastening machinery.
3. Rejects were greatly reduced, because SPEED NUT brand fasteners minimize assembly damage and compensate for misalignment.

See *your* assembly costs in a new light—through a comprehensive Fastening Analysis. Ask your SPEED NUT representative for details on this service. Or write: TINNERMAN PRODUCTS, INC., Cleveland, Ohio. In Canada: Dominion Fasteners Limited Hamilton. In England: Simmonds Aerocessories, Treforest, Wales.


Resilient SPEED CLIP slips over edge of transformer box cover, holds securely, yet permits easy snap-out removal for servicing unit.
"U" Type SPEED NUTS are used to secure louvers to frame of fixture. Self-retaining characteristics of SPEED NUTS permit easy blind assembly.
Ideal for center-panel locations, "U" Type SPEED NUTS snap into position through rectangular hole and provide vibration-proof attachment of transformers.
TINNERMAN
Speed Nuts

der contruction in Gary, Ind., and which is scheduled to manufacture automobile body components for Studebaker and Nash. He is succeeded at the Red Lion plant by **Lee N. Blugerman,** who has been works manager since 1949.

—o—

Hydro-Blast Corp., Chicago, announces election of **Paul H. Dunakin**

PAUL H. DUNAKIN
. . . Hydro-Blast executive vice president

as executive vice president, and **Ronald Webster** as sales manager. Mr. Dunakin has retired as vice president and general manager of *Popular Mechanics Magazine.* Mr. Webster was vice president and general manager of Hydro-Blast until 1941, when ill health required him to serve as a consultant only.

—o—

P. A. McTerney was appointed administrative assistant to the manager of large motor and generator divisions, **General Electric Co.,** Schenectady, N. Y. **S. V. Travis** assumes Mr. McTerney's former position as manager of sales for the divisions, with **L. H. Matthes** as assistant manager of sales.

—o—

John A. Menster was appointed assistant manager of sales, Welded Tube Division, **Babcock & Wilcox Tube Co.,** Alliance, O.

—o—

Orville H. Mowbray has rejoined the sales engineering staff of **National Radiator Co.,** Johnstown, Pa., and again has been assigned to the Baltimore branch sales office.

—o—

National Lead Co., New York, announces the following changes: **Ellis E. Busse** will be manager, St. Louis branch, pigment division, and **Roy R. Stamm** of the metal division. **Walter H. Lessmann** will manage a new southwestern branch, pigment division, with headquarters in Dallas, which will operate in Texas and Oklahoma, and **Richard I. Hall** will be assistant manager of its metal division. **Eric G. Orling** will manage the Cleveland branch, pigment division, and **George Sathre** the metal division.

—o—

Nicholson File Co., Providence, R. I., appointed **C. E. Ingham** as representative in Greater New York and New Jersey, where he will replace **James Jaques,** transferred to the Middle West. Mr. Ingham formerly was with Brown & Sharpe Mfg. Co., Providence, R. I., and with Crown Mfg. Co. of Pawtucket, R. I.

—o—

H. L. Howard, executive vice president and treasurer, Texas Engineering & Mfg. Co. Inc., was elected president of **Luscombe Airplane Corp.,** Dallas.

—o—

Hal White Jr. was appointed purchasing engineer for **Hyster Co.,**

HAL WHITE
. . . purchasing engineer for Hyster Co.

Portland, Oreg. Chief responsibility of his new position will be study of the comparative economic factors involved in quantity buying or factory production of parts used in Hyster's truck and tractor equipment.

—o—

Walter T. Nicholson was appointed assistant to rolling division superintendent, South Chicago works, **Carnegie-Illinois Steel Corp. Patterson S. Weaver,** assistant to general superintendent, succeeds Mr. Nicholson as superintendent, wide flange structural department, and is succeeded by **John R. Ferguson Jr.**

—o—

William W. Smith Jr. was elected to the newly created post of executive vice president and secretary of **John Hassall Inc.,** Brooklyn, N. Y.

—o—

William N. Brown was appointed purchasing agent, **Pittsburgh Steamship Co.,** Cleveland, subsidiary, U. S. Steel Corp. He has been western district purchasing agent at Chicago for American Steel & Wire Co., another subsidiary.

—o—

Stromberg-Carlson Co., Rochester, N. Y., appointed **Lynn C. Holmes** as associate director of research.

—o—

E. W. Harwell was elected a director and **G. A. Krebs** assistant treasurer of **Fort Duquesne Steel Co.,** Pittsburgh. Mr. Harwell is president, Hamilton Steel Co., subsidiary.

—o—

Link-Belt Speeder Corp., subsidiary, Link-Belt Co., elected **Columbus Basile** vice president for operations, with headquarters at Cedar Rapids, Iowa.

—o—

James A. Cowan was transferred to Pittsburgh as direct factory representative for **Macwhyte Co.**

—o—

Gould Storage Battery Corp., Trenton, N. J., appointed **F. A. Miller** as northeast regional manager, and promoted **Mal Janis** to New York district manager succeeding Mr. Miller.

—o—

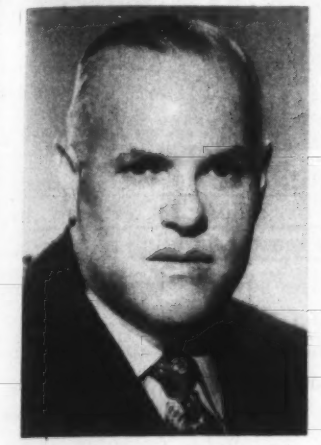
Gareth W. Speer was appointed assistant treasurer of **Kaiser-Frazer Corp.,** Willow Run, Mich.

—o—

John L. Carmichael was appointed general purchasing agent at **Delco Appliance Division,** General Motors Corp., Rochester, N. Y. He will continue as traffic manager of the division.

VAS L. HOWE
. . . Niles-Bement-Pond appointee

Vas L. Howe was appointed advertising manager of **Niles-Bement-Pond Co.,** Hartford, Conn., including Pratt & Whitney Division, Chandler-Evans Division, and Potter & Johnston, subsidiary in Pawtucket, R. I. **Fred J. Dunne** was appointed to the newly



RALPH G. SWEENEY
. . . president, Allyne-Ryan Foundry

ROBERT S. CAVE
. . . general sales manager at Severance

ARLO ISRAELSON
. . . Eriez Mfg. Co.'s chief engineer

created position of assistant advertising manager.

—o—

Ralph G. Sweeney was named president, **Allyne-Ryan Foundry Co.,** Cleveland, succeeding the late **Frederick D. Ryan.** Mr. Sweeney joined the company in 1916. He served in various departments of the foundry and laboratory, and became purchasing agent in 1927 and treasurer of the company in 1946.

—o—

Inland Steel Products Co., Milwaukee, made two personnel changes in its purchasing department. **Frederick E. Wood** was named to the position of steel buyer, and **Lester Bufton,** buyer of supplies and resale items.

—o—

George L. Tillson was elected president and treasurer, **Edgcomb Steel Corp.,** Hillside, N. J. **H. L. Edgcomb,** president since foundation of the company in 1927, becomes chairman of the board.

—o—

Otto W. Carpenter, a vice president, Chain Belt Co., Milwaukee, was elected to the board of directors of **Perfex Corp.,** Milwaukee. He fills an additional directorship created by amendment of the company's charter.

Robert S. Cave was named general sales manager, **Severance Tool Industries Inc.,** Saginaw, Mich. He started with Severance in 1940 as a machine operator, and continued working his way through various capacities to his present position.

—o—

Paul H. Daley was named general superintendent of **Heppenstall Co.,** Pittsburgh, succeeding **Harry W. Davidson,** recently elected secretary-treasurer.

—o—

Ray Chubb, formerly of A. M. Castle & Co., is now associated with **Northern California Hardware & Steel Co.,** San Francisco, as manager of steel sales.

—o—

John G. Hubbard was named field engineer and **Howard H. Sprinkle** assistant sales manager, **Republic Rubber Division,** Lee Rubber & Tire Corp., Youngstown. Mr. Hubbard will represent the division in South Carolina and northern Georgia, with headquarters in Columbia, S. C.

—o—

George W. Bowles was appointed parts and accessories manager, western division, **Ford Motor Co.,** Dearborn, Mich.

Arlo Israelson was appointed chief engineer, **Eriez Mfg. Co.,** Erie, Pa., succeeding **W. W. Mojden,** now with Mills-Winfield Co., Eriez sales office in Chicago. Mr. Israelson joins Eriez after association with Flynn Machine Co. Inc., San Jose, Calif.

—o—

R. D. Moody, manager, San Francisco district, **Allis-Chalmers Mfg. Co.,** was named manager of the Los Angeles district succeeding **C. W. Schweers,** appointed New England manager. **James A. Longley Jr.** was appointed San Francisco manager. **Otho V. Tally** was named manager, Midwest region, succeeding **Benjamin F. Bilsland,** who retires in July.

—o—

John L. McLaughlin was appointed assistant manager of service, **Chicago Vitreous Enamel Product Co.,** Cicero, Ill.

—o—

John C. Cairns, executive vice president, **Stanley Works,** New Britain, Conn., was elected president succeeding **Richard E. Pritchard,** now chairman of the board. **Stephen H. Cross,** general manager, electric tool division, was chosen vice president of that division to succeed **L. M. Knouse,** retired.

OBITUARIES . . .

Raymond T. Mesker, secretary, **Aluminum Industries Inc.,** Cincinnati, died Apr. 8 in Santa Monica, Calif.

—o—

F. A. **Mitchel,** 64, chief engineer for **Milwaukee Bridge Co.,** Milwaukee, died Apr. 5 of a heart attack.

—o—

A. W. Wigglesworth, former president, **Hill-Clarke Machinery Co.,** Chicago, died at Miami Beach, Fla., Mar. 31. He retired in 1946 after being associated with the company more than 50 years.

—o—

William H. Warren, 75, general manager, **Wheeling Steel Corp.** plant in Steubenville, O., died Apr. 4.

—o—

Robert B. Dickson, 67, president, **Kewanee Boiler Corp.,** Kewanee, Ill., died of a heart ailment Apr. 9.

—o—

Harry N. Forsberg, 57, vice president and sales manager, contract manufacturing division, **Geuder, Paeschke & Frey Co.,** Milwaukee, died recently.

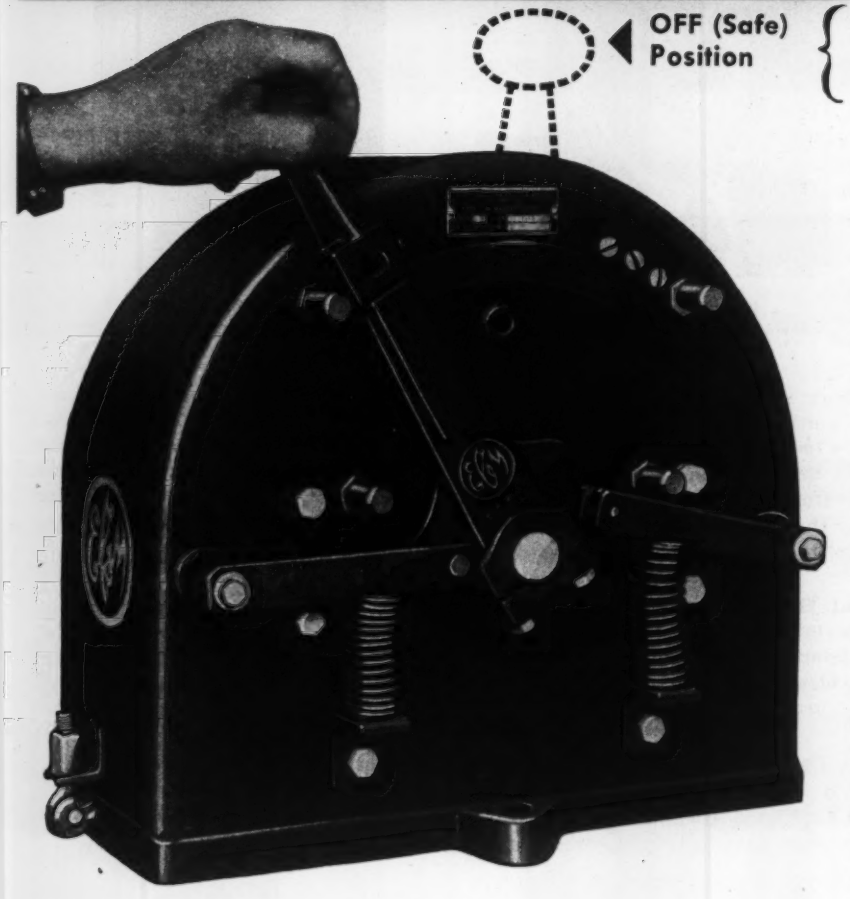
—o—

Jesse S. Langston, 67, assistant manager of sales, bar division, **Republic Steel Corp.,** Cleveland, died Apr. 5 following an operation.

—o—

Charles F. Northup, 86, who retired in 1941 as Syracuse, N. Y., representative of **Brown & Sharpe of New York Inc.,** died Apr. 3.

Master Switch *automatically* returns to Off-Position from any speed-point in either direction . . .



OFF (Safe) Position

Provides Safe Operation should operator fall or otherwise remove his hand from master-handle.

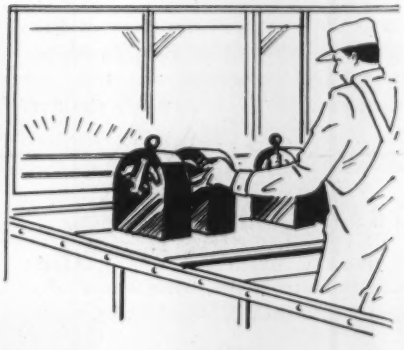
There are several *speed-control* applications where *safe* practice dictates that power be automatically disconnected from the motor-driven machine the instant the operator leaves his station or for some other reason removes his hand from the master switch. A typical example is a transfer (or larry) car with a *spring-return* master switch mounted on the side within reach of the operator as he walks along with the car. Should he trip and fall, the master switch automatically centers itself in the off (safe) position.

The EC&M Cam-type Master Switch (as illustrated) is ideal for this service because of the *short-throw* of the operating handle. From the "full-on" to the "off" position, the handle of an EC&M Master travels less than 40° from the sixth speed-point in either direction to the off (central) position. There's nothing to equal the EC&M Cam Master Switch for spring-return service.

Make your own Compact Layouts with EC&M Bulletin 1190 Cam MASTER SWITCHES

in Crane-cabs or Mill-pulpits

For new installations or when re-vamping existing equipment, take advantage of the narrow width and short-throw of EC&M Cam Master Switches for improved performance. These features appeal to operators.



Write for Bulletin 1190 giving details of these short-throw, narrow width Masters

THE ELECTRIC CONTROLLER & MFG. COMPANY

2698 E. 79th STREET — CLEVELAND 4, OHIO

Production AND Engineering NEWS AT A GLANCE

BATH THAT PAYS OFF—A handy salt bath is currently saving Washington Steel Co., Washington, Pa., about $4000 per month, not to mention headaches connected with the breakage of work rolls of its Sendzimir reversing cold rolling mill. In the early days of the mill's operation as many as 50 rolls per month needed replacement due to work hardening, accompanying surface embrittlement that caused surface spalls, stress ruptures and breakage. Now, after a two-hour run the work rolls are removed from the mill, redressed and stress relieved in a nearby Ajax furnace for 2½ hours. Procedure practically eliminates breakage, replacements being reduced to about five per month.

NEW HIGH-STRENGTH ALLOY— New lightweight, high-strength titanium alloy which retains basic properties at high temperatures and is highly resistant to corrosion is reported by the Navy Bureau of Aeronautics. It is composed basically of 5 per cent chromium, 3 per cent aluminum and the rest titanium, and is being used in jet-plane parts. Currently the Navy bureau is working closely with industry to facilitate full commercial applications.

WANT TO CUT ABRASIVE DISK COSTS?—Costs can be cut by about 35 per cent by a method of refinishing worn abrasive disks developed by Elson Abrasive Corp., Cleveland. According to the company, Elsonized treated disks perform as well as any new disk. Furthermore, the process is capable of meeting every possible production specification.

RECORDING "ON THE BALL"—Ball-point pens are going industrial. They are beginning to play important roles in electronic strip chart recorders currently produced by the industrial division of Minneapolis-Honeywell Regulator Co. The pens are especially suitable for applications where measurements demand rapid movements across the instrument chart. Also quick-drying, non-smudging characteristics of the ball point makes it well adapted for records where lines are spaced closely.

PURER THAN STERLING—Silver and tin, two metals far apart in value are working closely and effectively in solving lubrication and corrosion problems of high-speed aircraft engines. They are used as thin deposits on precision aircraft bearings produced by SKF Industries Inc., Philadelphia. Plating the bronze retainers of roller bearings with silver, it is pointed out, lessens chances of one metal "seizing" another when operating under extremes of speeds and temperatures. The thin coating, which is one one-thousandth of an inch thick and acts as a dry lubricant, is 99.99 fine—far purer than sterling.

LIQUID TO SOLID TO LIQUID—A liquid that can instantly change to a solid and then return to a liquid again is the basic feature of an improved magnetic-fluid clutch built by General Electric Co., Schenectady, N. Y. The device, only 6 inches long and 6 inches diameter, is capable of carrying enough power to lift one ton 1000 feet per minute. Two metal cylinders make up the clutch. These can rotate independently on the same axis and are separated by a magnetic mixture of oil and finely-divided iron powder. Also rigidity of the fluid can be controlled to various degrees if slippage is desired. Commercial possibilities are yet to be explored.

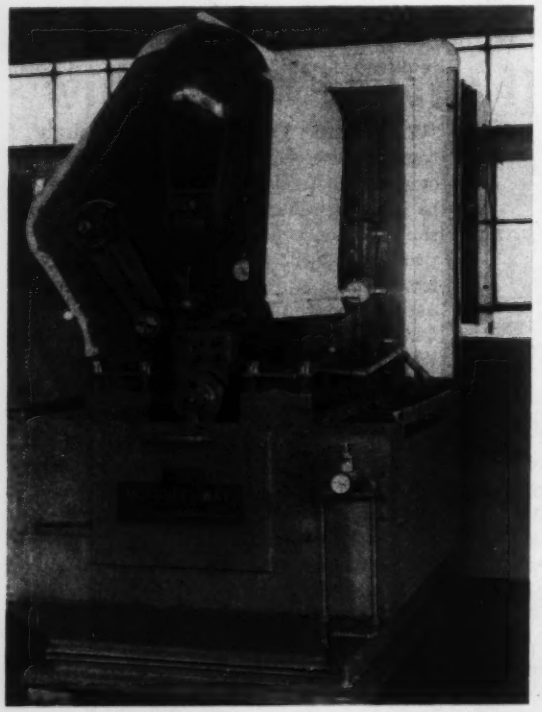
EXPERIENCE COUNTS — Copper and each of its alloys have individual characteristics as to ductility, intrinsic hardness, tensile strength, etc., plus the type of chips they produce. With these varying characteristics, it is impossible to clearly define speed, feed and form of tool to be used in machining. For example, at one time it was thought that ductility of an alloy depended on how much copper was present. But with discovery that a small amount of lead reduces ductility in an alloy, copper content no longer can be used as a guide. Today, more knowledge of the chemical makeup of an alloy is important. (p. 78)

SMALL PARTS MATERIAL—Adaptability of zirconium for stamping and drawing in producing small parts, and its amenability to forging larger shapes, overcome some of the restrictions imposed by lack of suitable casting methods. Satisfactory sheet and rod is forged and rolled at 1560° F by protecting the metal from oxidation with an iron sheath. As an illustration of ductility and its adaptability to production methods, several wrenches were made by drop forging an annealed 9/16-inch rod under an 800-pound hammer in dies used for a nationally known chromium-molybdenum wrench. The metal worked readily at 1200 to 1290° F and produced sharp, well-filled blanks with fewer blows than were ordinarily required. (p. 82)

"WASHING" THE STEEL—Although temperature for rolling ingots of any one grade of steel varies from plant to plant, experiments indicate that the highest practical temperature produces best results. Thus today low and medium carbon steels are usually heated to within a range of 2350 to 2450° F. High carbon steels are heated between 2300 and 2350° F. Before the last war, rolling temperature on blooming mills was usually somewhat lower. But during the war it was necessary to increase production with available facilities, and use of higher ingot temperatures helped accomplish this. In fact, an improvement in surface quality was often obtained due to the heavier scaling which had a tendency to remove many superficial surface defects. This is the action sometimes referred to as "washing" the steel. (p. 86)

Fig. 1—General view of flat polishing and coating equipment. Stock is loaded on 30-inch conveyor belt at right, passes through rolls to "iron" burred edges, then on to six-station belt polishing unit

Fig. 2—One of the polishing heads showing arrangement of rolls which carry the abrasive belt. Stock passes under the lower drive roll at speed of 45 fpm, roll pressure being controlled by air system. Top roll oscillates slightly to extend belt life and avoid a pattern on the steel surface



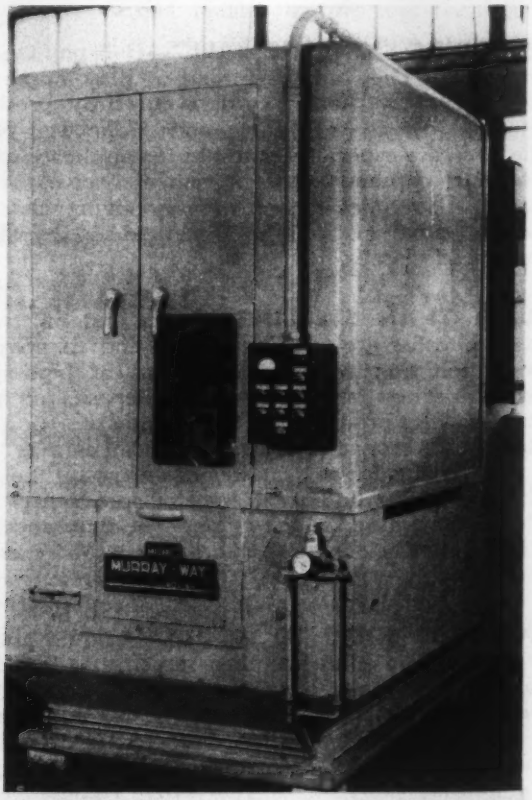


Fig. 3—In operation, belts are enclosed by sheet steel cabinet, with viewing window. Ammeter on control panel shows load on drive motor which indicates degree of wear on abrasive

can save with this new method of

"PREPOLISHING" BEFORE FORMING

Method employed by a leading automotive parts plant practically eliminates tedious and expensive hand polishing of steel stampings prior to plating. Steel sheets are prefinished flat, coated with water-soluble plastic, drawn, then cleaned

By A. H. ALLEN
Detroit Editor, STEEL

IN THE manufacture of formed, plated steel parts, such as automotive bumpers, guards, grilles and trim elements, a major element of cost always has been the extensive amount of tedious hand polishing required after forming but before plating to remove die scratches, imperfections in the steel and other defects which would show through the plating.

For a number of years the automotive industry has been attacking this cost problem, with the aid of materials and equipment suppliers. Exceptional economies have been proved through machine polishing of steel in the flat, coating with a water soluble and heat-setting chemical film, press forming, washing off the film and proceeding with conventional plating operations.

"Prepolishing"—This discussion reviews what one sheet metal plant has done with "prepolishing." In the early postwar period considerable trouble was experienced with getting good finish on parts prior to painting or plating. Defects appeared in steel surfaces after drawing and in polishing which seemed to come either from off-grade cold-rolled steel or some deficiency in press practice.

So a method was devised to coat the flat steel before forming parts which were subject to severe draws. The results were so good that the idea was extended to parts of the "luster" (chrome plated) class. Steel blanks were coated, formed and transferred directly to copper plating without any polishing. The system clicked and experimental work was stepped up on the whole subject.

Hand Polishing Out—Key to the process appeared to be an efficient machine setup for polishing the steel, either in flat sheets or blanks. Vertical abrasive belt polishers of the wet type were studied carefully. A four-head machine with 24-inch wide belts, later increased to 30 inches, was installed after preliminary tests on a two-head unit had been checked. Shortly thereafter it was decided to discontinue all hand polishing of formed parts before plating and this meant that experimental equipment became a production line, thereby stimulating progress of the method. As of today, a six-head polishing unit, completely integrated with washing, drying, coating and related equipment is operating full tilt, and all hand polishing equipment has long since been removed.

But there was a lot more, like: Elimination of yearly model change tooling necessary to the conventional form polish method; less area for equipment —15,000 sq ft for the old hand polish and 3500 for the new prepolish system; elimination of the large amount of labor needed in an extensive polishing wheel department, as well as labor required to hand polish service parts for past models which are continually scheduled along with regular production; important savings in power costs; reduced cost of die maintenance in the press department, and better quality control in all phases of the operation.

Different Parts Prepolished—Prepolishing is carried out on many different sizes and shapes of parts. They include radiator grille components, rear bumpers, bumper guards, bumper wing guards and the like. No chemical coating is applied to the polished steel blanks for parts requiring only a slight draw, or where none of the metal is under the blankholder die in the press. In light draws, metal flow is at a minimum and the danger of die scratches is of no consequence.

In any event, the amount of hand polishing required on the parts just mentioned has been reduced by 90 per cent, along with a considerable degree of die honing formerly a regular part of press practice to avoid scratches.

Surmounting all the problems incident to perfecting the machine polishing of flat steel was not done overnight. Principal stumbling blocks were abrasive belt life, type of coolants, effective coatings and how to apply them, control of belt pressures, elimination of belt deterioration from burred edges on blanks and others.

Flat Polishing Steps—Tracing through the various steps in the flat polishing operation, steel stock is delivered to the finisher either from blanking presses or as received from mills to a loading conveyor which feeds individual pieces to the finisher and holds the width of the stock to the 30-inch width of the belt. First operation is to iron down burred edges left by the blanking press. This (*Please turn to Page* 94)

Correct Machining of

COPPER-BASE ALLOYS

Shrinks Both Tool and Production Costs

To insure maximum production and tool life, as well as accuracy and fine finish on work, attention must be paid to details of tool design based on research and practical experience in cutting these materials

By MALCOLM BUELL
and
J. J. McGUINNESS
Bridgeport Brass Co.
Bridgeport, Conn.

COPPER and each of its alloys have individual characteristics as to ductility, intrinsic hardness, tensile strength, etc., plus the type of chip they produce. With these varying characteristics it is impossible to clearly define speed, feed and form of tool to be used in machining whether it be a single-point tool, form tool, milling cutter, drill, tap, chaser, reamer or saw.

To further complicate the engineer's job, the type and condition of the machine, type of coolant being used, size of the drill or tap, amount of metal being removed by the turning tool—whether face width of the forming tool or depth of cut—all enter into the selection of speed, feed and tool selected. However, it is possible to group copper and its alloys into three classifications and set up broad ranges of speeds, feeds and rake and clearance angles for each division.

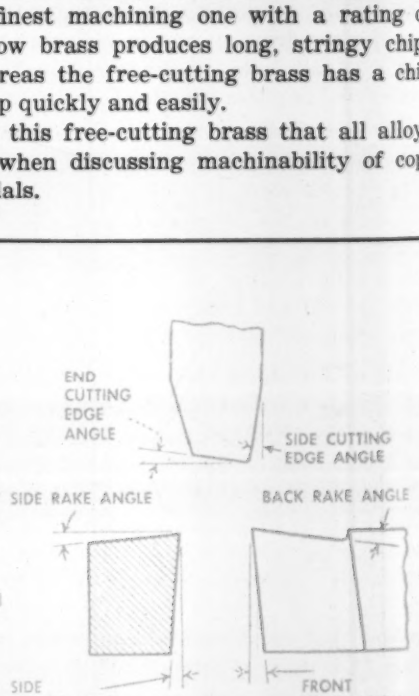
Copper Content Not Guide—Before going into these groups, it is better that we realize fully that as the ductility of the alloy being machined increases the speed of machining decreases. However, ductility does not depend on the amount of copper in the alloy. At one time this was true, but with the discovery that a small amount of lead reduces ductility in an alloy and therefore increases the speed with which it can be machined, a mechanic must know more about the chemical makeup of the alloy other than the copper content. At the same time, some of the newer alloys—such as silicon-aluminum bronze—are not ductile despite 90 per cent or more copper.

As an example of how lead speeds machining by producing a brittle, easily-broken chip, we can compare free-cutting leaded brass and the common yellow brass. Yellow brass has 65 per cent copper and 35 per cent zinc. This alloy has a machinability rating of 30. By adding lead (3.5 per cent) to this yellow brass and only reducing the amount of copper by the amount of lead added, we have an alloy which ranks as the finest machining one with a rating of 100. The yellow brass produces long, stringy chips when cut, whereas the free-cutting brass has a chip which breaks up quickly and easily.

It is against this free-cutting brass that all alloys are compared when discussing machinability of copper-base materials.

TURNING DATA

Tool Material	Relief Angles Degrees Side	Relief Angles Degrees Front	Rake Angles Degrees Back	Rake Angles Degrees Side	Surface Speed Feet per Minute	Roughing Speed In. per Min. 1000ths	Finishing Feed In. per Min. 1000ths	Coolant
Group I								
HS Steel	0–5	6	0	0–3	300–700	6–20	3–15	Light Mineral Oil or Soluble Oil
Carbide Tipped	4–6	4–6	0	2–6	500–1000	15–25	5–15	
Group II								
HS Steel	5–10	6–15	5–10	5–10	150–300	15–35	5–15	Mineral Oil or Soluble Oil or Base Plus 5–15% Lard Oil
Carbide Tipped	4–8	4–8	0–5	4–8	400–600	15–30	5–15	
Group III								
HS Steel	10–20	10–15	10–20	20–30	75–150	15–40	5–20	Mineral Oil or Base Plus 10-20% Lard Oil
Carbide Tipped	7–10	7–10	4–8	15–25	300–800	15–30	8–15	



Grouping of Alloys—Group 1 contains alloys with a rating of 100 down to those of 70 and all are leaded. Group 2 covers all the alloys with a rating from 30 up to 70 such as Muntz metal containing 60 per cent copper to red brass with 85 per cent copper. In this classification aluminum-silicon bronze (Duronze III) also falls with a rating of 60. Group 3, the most difficult to machine, includes the nonleaded coppers, phosphor bronzes, silicon bronze, nickel silvers and the high-copper alloys such as gilding metal.

Although many factors are rolled up in the word "machinability" the five important ones are: 1. Speed of machining, 2. tool life, 3. finish, 4. accuracy, 5. power required.

Machining Speed—Speed of machining is actually limited by one thing—heat generated between the tool and work by friction. If this heat can be carried away at a rate sufficient to prevent softening of the tool and welding of the alloy on the tool, in all probability it is quite possible that cutting speed is unlimited. The efficiency of the coolant-lubricant and the manner and speed in which the chip is carried away from the tool controls the temperature of the work and the tool.

In the case of leaded materials, as well as silicon-aluminum bronze, the chip breaks up at a rapid rate and is only in momentary contact with the tool. In this case a cutting medium must be on the coolant side with very little regard for lubrication. Rake angles can be held to a minimum on tools as well as clearance. The small rake angle breaks the chip almost immediately and the reduced clearance gives the cutting edge of the tool greater support.

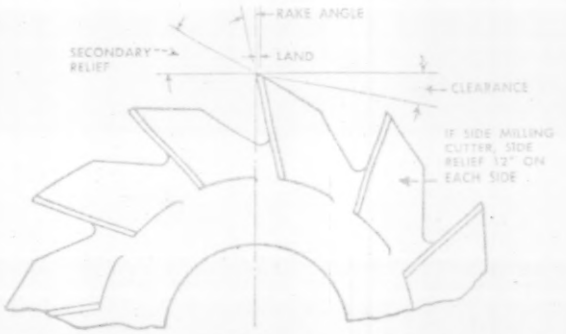
On the other side of the fence are the more ductile alloys. They tend to weld on tools, therefore a protective film must be built up on the work and tool in the form of a lubricant. By doing this the cooling characteristic of the cutting medium is diminished, necessitating a reduction in turning speed. Rake and clearance angles must be increased to start the chip flowing off the tool as rapidly as possible. The greater clearance is necessary to prevent building up on the face of the tool, thus producing a rubbing or burnishing condition. In this latter case, the higher the finish produced in grinding of the tool the less friction is produced by the chip with the tool.

On high tensile strength alloys such as silicon-aluminum bronze, much heat is produced despite the brittle chip, by the toughness of the material itself. Being intrinsically harder, these alloys produce considerably more heat through friction and at the same time actually wear the cutting material much faster than the most standard alloys of copper.

Tool life, in addition to the points touched on in the discussion of speed, must be considered from many other views. Depth of cut is important. If 0.250-inch is being removed from a side in a turning operation the tool cannot be expected to stand up as long as the one removing only 0.032 on a side. Not only is more heat being generated in the first instance but more stock is being removed. Where possible on deep cuts it is advisable to split the operation into a roughing and finishing tool. A wide forming tool likewise removes more stock and creates more heat.

MILLING DATA

Group	Rake Angle Deg.	Relief Angle Deg.	Land	Coolant	Speeds
I	0-10	10-15	0.015-0.030	Soluble oil or light oil	200-500
II	0-10	5-15	0.015-0.030	Soluble oil or light oil	150-200
III	0-15	5-15	0.015-0.030	Soluble oil or light oil thinned with kerosene	50-150

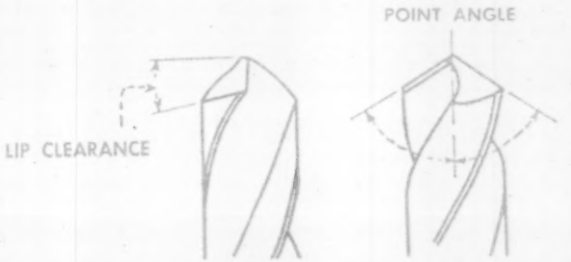


Hardness—Hardness is also another factor to be considered in cutting tools, especially where the alloy being cut has considerable natural hardness. Care must be taken in hardening of high speed tools to insure the highest possible Rockwell obtainable without danger of brittleness. In grinding, it is essential that the finish be excellent and that no burning has occurred to lower the hardness at the cutting edge. Rigid mounting of tools and setting them either dead center or slightly below will also add to their life. A tool set above center nullifies the front clearance angle, thereby producing greater friction, tool wear and also burnishes rather than cuts the material.

Finish is affected by practically every condition en-

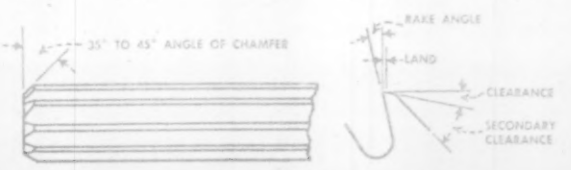
DRILLING DATA

Group	Clearance Angle Deg.	Drill Point Angle Deg.	Cutting Edge	Speed Feet per Min.
I	12°-15°	118°	Flatten to 0° Rake	200-500
II	12°-15°	118°	Flatten to 0° Rake	75-250
III	12°-20°	100°	Full Rake	50-125



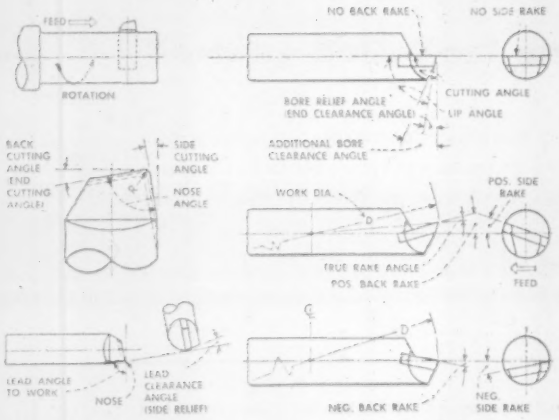
REAMING DATA

Group	Back Rake	Clearance	Land	Speed
I	0°	6°-8°	5°-10°	100-200
II	0°	6°-8°	10°-15°	75-150
III	3°-6°	6°-8°	10°-15°	69-90



BORING WITH CARBIDE TOOLS

Group	Cutting Speed (Feet per min.)	Back Rake Degrees	Side Rake Degrees	Coolant
I	800-3000	0	5	Dry, Paraffin oil Soluble Oil
II	450-1500	0-5	5-10	Soluble oil, Mineral oil and 10 pc. Lard Oil
III	200-800	5-10	15-20	Mineral oil and 20 pc. Lard oil



countered in machining. Higher speeds and slower feeds can, in many cases, solve the problem. However, the condition of the machine-play in the spindle, lack of rigidity in the tool posts and ways, and the type of lubricant affect the finish considerably. When these factors have been checked, the answer generally is found in chip control—the rake and clearance angles on the tool. Too much clearance and large rake angles can be more troublesome than too little in both cases. When the front clearance is too small a burnished or bumpy surface is produced and heat is increased through friction. High rake and clearance angles cause chattering, hogging in by permitting the tool to vibrate, even though to a minute degree.

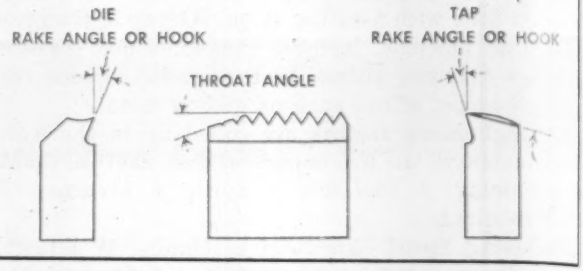
Accuracy — Discounting machine errors, accuracy can be directly attributed in many cases to too much heat generated through friction, but chip control, again, is probably the greatest factor. If the tool is not cutting cleanly the increased pressure between work and tool forces the work away from the tool

THREADING SPEEDS (TANGENTIAL)

N. F. Series (Cast Brass, Bar Brass, Phos. Bronze, Copper) Dia.	RPM	Surface Speed	N. C. Series (Cast Brass, Bar Brass, Phos. Bronze, Copper) Dia.	RPM	Surface Speed	Pipe (Copper, Yellow Brass) Dia.	RPM	Surface Speed
¼	1222	80	¼	1070	70	⅛	566	60
5/16	978	80	5/16	856	70	¼	424	60
⅜	815	80	⅜	662	65	⅜	338	60
7/16	656	75	7/16	568	65	½	250	55
½	573	75	½	459	60	¾	200	55
9/16	475	70	9/16	407	60	1	145	50
⅝	428	70	⅝	367	60	1¼	115	50
¾	357	70	¾	279	55	1½	101	50
⅞	285	65	⅞	241	55	2	81	50
1	258	65	1	210	55	2½	60	45
1⅛	204	60	1⅛	187	55	3	49	45
1¼	183	60	1¼	153	50	3½	43	45
1½	153	60	1½	127	50	4	38	45
1¾	120	55	1¾	109	50	4½	30	40
2	105	55	2	86	45	5	27	40
2¼	85	50	2¼	76	45	6	23	40
2½	76	50	2½	69	45	7	20	40
2¾	69	50	2¾	62	45	8	15.4	35
3	64	50	3	5.1	40	9	13.9	35

TAP AND DIE CHASERS

Alloy Group	TAP Rake Deg.	TAP Throat Deg.	DIE Rake Deg.	DIE Throat Deg.
1	—5 to +5	15	—10 to 0	15
2	5 to 12	20	0 to 10	20
3	15 to 25	30	12 to 30	30



and at the same time thrusts the carriage back. This condition normally accounts for oversize parts. Undersize dimensions are generally caused by excessive heat. Vibration in the machine, tool or thin long workpieces will lead to variations in dimensions. Lighter cuts will generally reduce this vibration. Sharp tools are imperative in attempting to hold accurate sizes.

Power needed to do the job is often overlooked with high-strength alloys. Too light a machine for the job at hand leads to almost every trouble encountered by the machinist. It is better to overestimate the job than to underestimate it.

Machining Silicon-Aluminum Bronze — Screw machine fabrication of silicon-aluminum bronze can be increased through fully understanding the physical characteristics of the material and selecting machines, tools and methods capable of doing the job. This alloy has a tensile strength in the annealed state of 90,000 psi with a hardness of B85 (Rockwell). Although the chip is brittle and breaks off similar to the leaded screw machine brass, the toughness of silicon-aluminum bronze necessitates the use of a machine roughly 25-30 per cent bigger than what would be selected for leaded brass rods.

Friction between the tool and this bronze is considerable and heat must be carried off as quickly as possible. A sulphur-base mineral oil with a comparatively low viscosity of around 100 Saybolt seconds acts satisfactorily but stains work. Mineral oil is generally utilized. The coolant lubricant must be well directed and in plentiful supply.

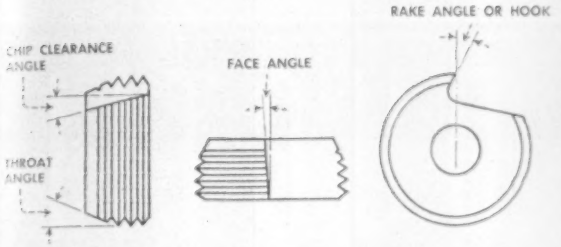
The highest possible hardness is recommended for the tools. For example, a form cutter with a C62 Rockwell gave 4 hours less life than the same tool of C65 hardness under identical conditions. For long-run production the use of cast metal or carbide-tipped tools is strongly recommended for increased tool life and high speeds.

Tools must be set on center, or slightly below, to insure correct front clearance as silicon-aluminum bronze will wear the tools at a rapid rate if there is any rubbing. Rigidity of tools and tight spindles will also reduce chatter and permit higher speeds.

Minimum Rakes Advisable—Rake angles on forming and box tools should be held to a minimum, ranging from minus 5 degrees to plus 5. For a starting point, zero rake is advisable. This angle can then be varied either side of center to fit the demands of

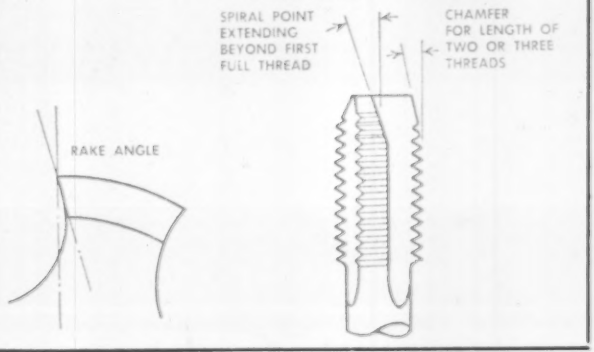
CIRCULAR CHASERS

Alloy Group	Rake Deg.	Face Deg.	Throat Deg.	Clearance Deg.
1	—5 to +5	0	25	12
2	10 to 20	1 to 2	25	12
3	15 to 35	2 to 3	25	12



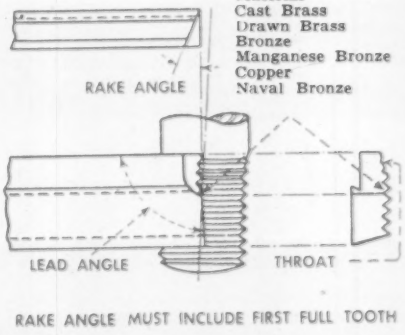
TAPPING DATA

Group	Rake	Chamfer	Coolant
I	2°-4°	10°-15° Two or Three Threads	Soluble oil, Light Mineral Oil.
II	5°-8°	10°-15° Two or Three Threads	Soluble oil, Light Mineral Oil.
III	8°-10°	10°-15° Two or Three Threads	Light Mineral Oil, fortified by lard oil



TANGENTIAL CHASING DATA

Material	Rake Angle
Cast Brass	—5 to Zero
Drawn Brass	+10 to +22
Bronze	+10
Manganese Bronze	Zero to +10
Copper	+28
Naval Bronze	Zero to +10



the job. Slightly higher speeds have been attained with negative rakes.

The hook on taps and chasers should also be kept to a minimum. One manufacturer has successfully operated with a minus 7-degree rake angle. Positive rake in any event should not exceed 2 to 4 degrees. Flattening the cutting lip of drills is used by many fabricators although the standard spiral drill can be used satisfactorily.

Speed and feed are dependent on the depth of cut or the size of taps and drills, and in the case of forming tools, the width of the cut. A speed of 150 to 250 surface feet per minute on high speed steel forming, cutoff and box tools is normal, with a feed from 0.001 to 0.003-inch per spindle revolution. However, in the case of carbide and other extra hard cutting tools speeds ranging from 250-500 sfpm can be attained.

Finishes Easily Controlled—Studies show that finishes remain good despite wide ranges of cutting speeds. The main difficulty at high speeds is maintaining cutting edges.

Sharp tools are essential in machining silicon-aluminum bronze. An interesting factor is that tools do not gradually become dull on this material but appear to fail within a few minutes after the first indication of wear. It is important that the dwell cycle be cut to the absolute minimum due to friction. Tool life is greatly increased when tools are withdrawn as soon as they stop cutting.

Serrated chucks are found necessary, especially where heavy cuts are being taken.

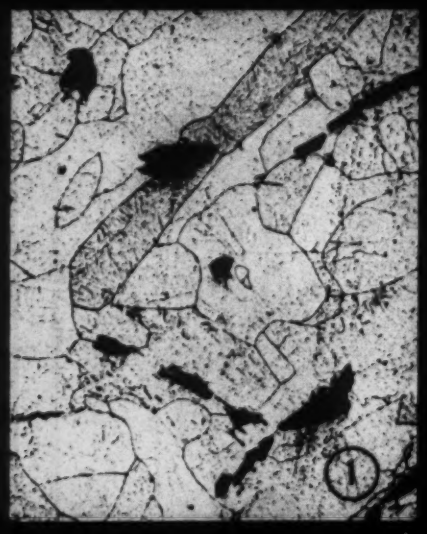
Coolant-Lubricants — Cutting fluids in machining operations accomplish three main functions: Cool work and tools, lubricate, carry minute chips away. A plentiful supply of coolant-lubricant is necessary in machining copper-base alloys. Heat generated by the plastic flow of the metal and the friction of the chip on the tool must be carried away as rapidly as possible to prevent softening of the cutting tool and to maintain accurate dimensions and finishes on the work. A flood of coolant, if not well directed on the work and tool, is not as efficient as a well-directed source. In some cases the chip itself may prevent the fluid from reaching its goal. In this event two or more streams may be utilized for best results.

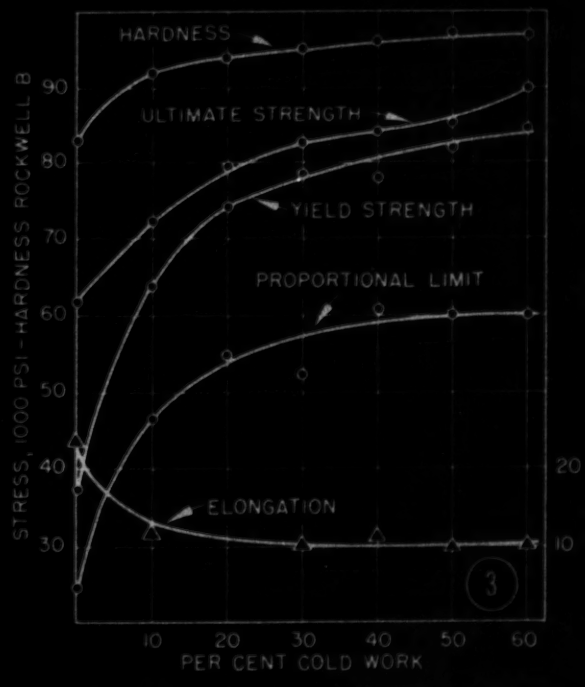
For leaded screw machine brass and other copper-base alloys falling in group 1, the main requisite is cooling. But it must be remembered that all cutting compounds lubricate to some degree. A low-viscosity mineral oil around 100-101 Saybolt seconds gives excellent results on this group. On automatic screw machines higher speeds and greater depth of cut have been obtained through the use of soluble oils. There are, however, two schools of thought on the use of soluble cutting oils. One maintains that soluble oil gets into spindle bearings and ways causing considerable trouble through sludge and corrosion. The other group maintains that the higher production more than offsets the reduction in the life of the machine which may or may not be caused by soluble oils. Twenty-five parts water to one part of soluble proves satisfactory for group 1.

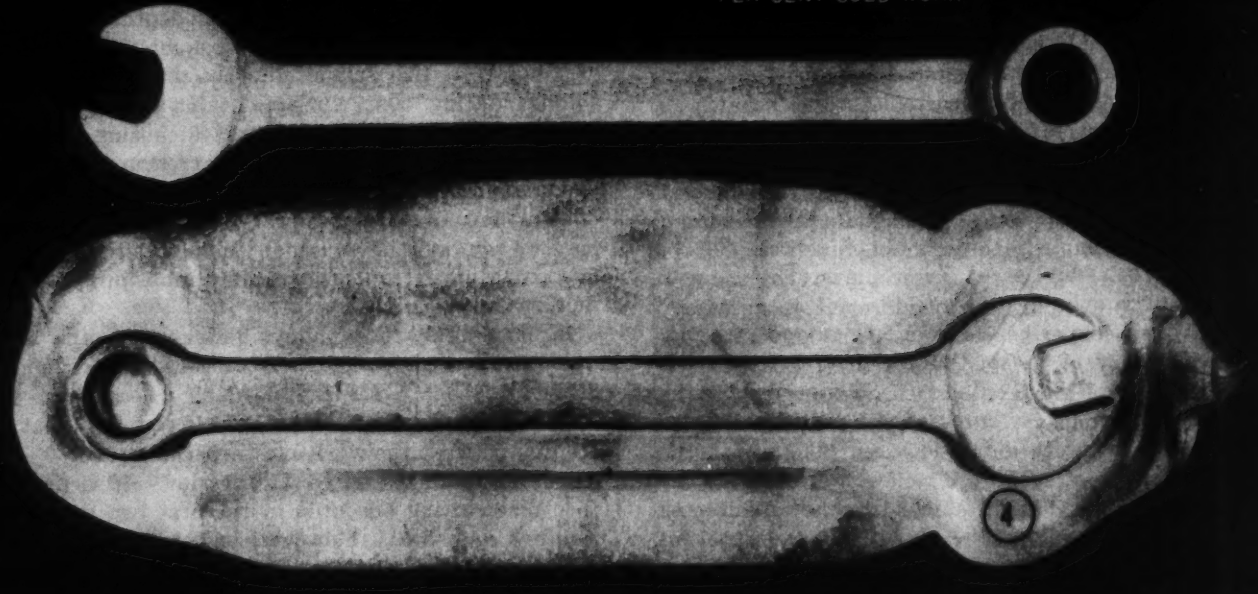
In machining those alloys in group 2, the same mineral oil used for group 1 can be used but the addition of about 5 per cent lard oil will increase the lubrication qualities. This will lower the heat of friction between the work and the tool.

Ductile Materials Need Lubrication. It is possible to utilize cutting oils used in the first two groups on group 3 materials. However, in this group the materials are much more ductile and tend to "weld" or "load" on the cutting tool. Sulphurized mineral oils, plus 10 to 20 per cent lard oil, will help to reduce loading. Staining is one drawback in lubricants containing sulphurized oils and fatty acids, and chlorine.

WORKING DUCTILE







By
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ZIRCONIUM

Adaptability of zirconium for stamping and drawing in the production of small parts, and its amenability to forging larger shapes, overcome some of the restrictions imposed by lack of suitable casting methods. Satisfactory sheet and rod is forged and rolled at 1560° F by protecting the metal from oxidation with an iron sheath

DUCTILE zirconium produced by thermal decomposition of zirconium iodide was first produced about 25 years ago by Van Arkel and coworkers at the Phillips plant in Eindhoven, Netherlands, and has been developed commercially in this country by the Foote Mineral Co. The iodide reduction process is inherently one of purification, at present limited to small-scale operation.

On the other hand, the process of reducing zirconium chloride with molten magnesium, as developed by the Bureau of Mines, has already produced several thousand pounds of ductile zirconium, and production operations are being expanded at the Northwest Electrodevelopment Laboratories to satisfy the increasing demand for this interesting metal.

Iodide-process zirconium is fabricated by direct working of the "as-deposited" rod without melting, and in some respects shows a malleability approaching that of tantalum. The fact that this high-purity material can be worked without contamination by a melting operation indicates that physical properties determined from this zirconium will always serve as a base point for zirconium metal investigations.

However, there is good reason for believing that the Bureau of Mines zirconium is of the same order of purity after the reduction step. Melting in a graphite crucible in high vacuum introduces minor amounts of impurities, the principal one of these being 0.10 to 0.15 per cent carbon. Since carbon improves most of the physical properties except elongation, little differentiation is made in this paper between metal produced by either reduction process. Zirconium metal produced by either process contains 0.5 to 3 per cent hafnium, depending on the source of ore. Consequently, the properties presented here, as well as those disclosed previously, must be regarded as typical of a zirconium-hafnium alloy and not of pure zirconium.

Casting—Methods of melting and casting zirconium have been described previously by Kroll and Gilbert.[1] The metal is extremely difficult to handle in the molten condition, since it either reduces or dissolves all of the known refractories, thereby increasing the problems of melting and casting, and at the same time producing a metal that is too hard and brittle to be useful. Briquetted zirconium sponge is placed in a graphite crucible and melted in a graphite resistor furnace. After a preliminary heating and degassing period (in high vacuum) the briquets are heated to fusion in 15 to 20 minutes.

Two methods of solidification have been used in this melting practice. The first allows the fused zirconium to solidify in the melting crucible and pro-

Fig. 1—Cast structure of chilled zirconium ingot. Grains are large and carbon occurs as long chains and star-shaped dendrites of zirconium carbide

Fig. 2—50 per cent cold worked zirconium, annealed 1 hour at 1000° C, brine quenched, X250

Fig. 3—Effect of cold working on properties of zirconium prepared by hot rolling at 650° C

Fig. 4—Drop-forged zirconium wrench

From data presented before the 31st annual convention, ASM, Cleveland, Oct. 15 to 21, 1949.

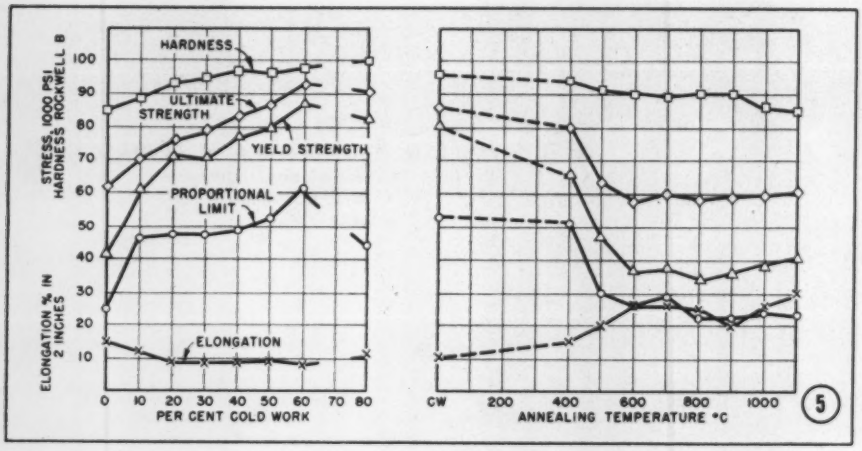

Fig. 5—Effect of cold working and subsequent annealing on properties of zirconium rolled at 850° C

duces a large-grained ingot approximately 3 inches in diameter and 3 to 11 inches long, weighing 5 to 18 pounds. This procedure has a disadvantage in that the crucible can be used only once and must be removed by turning in a lathe.

In the second method, the melting crucible is equipped for bottom pouring. A plug of zirconium melts after the charge is molten and allows the metal to flow into a tapered graphite mold. Ingots so obtained are about 2 inches in diameter by 6 to 10 inches long. This bottom-pour method is distinctly more economical in that both the melting crucible and mold can be used a number of times. Moreover, grain size and carbon content are reduced considerably. Cast structure shown in Fig. 1 is typical of the chilled ingots. Grains are large, and the carbon occurs as long chains and star-shaped dendrites of zirconium carbide.

Working—Reactivity of zirconium with air at elevated temperature complicates the initial working of zirconium ingots. Standard procedure to protect the metal consists of encasing the scalped ingot into a piece of tight-fitting, mild steel tubing (½-inch wall) and welding plugs in each end. Care must be used during welding to avoid slag pockets, since any slag left in the bottom of the weld may come into contact with the zirconium metal in subsequent hot working operations and cause localized high hardness areas, which may rupture the sheath and thereby produce oxidation.

Sheathed ingot is heated about 2 hours at 850° C (1560° F) and flattened with the forging hammer to 2 inches total thickness, the sides being lightly worked to keep them reasonably square. Forged ingot is then rolled at 850° C (1560° F) without removing the sheath. In general, the ingots are cross-rolled to produce about a 6-inch width of zirconium metal and then rolled longitudinally to the desired thickness. Reductions per pass are limited to 10 to 15 per cent owing to size of the mill, but undoubtedly greater reductions could be made with larger equipment. After annealing, the sheath is removed by shearing, and the zirconium can be either hot-rolled at 650° C (1200° F) or cold-rolled to finish thickness.

Effects of Heating in Air—Recently, Hayes and Roberson[2] studied the effects of heating Bureau of Mines zirconium in air and have shown that heating several hours at 700° C (1290° F), or a short time at 800° C (1470° F), produces no detrimental effects on the ductility of the metal. A number of 2-inch diameter bottom-poured ingots have been forged in air at 700° C (1290° F) and hot-rolled at 650° C (1200° F) to produce satisfactory sheet. It would appear that the sheath, while it facilitates working at higher temperatures, is not a necessary adjunct and will not be required in commercial practice.

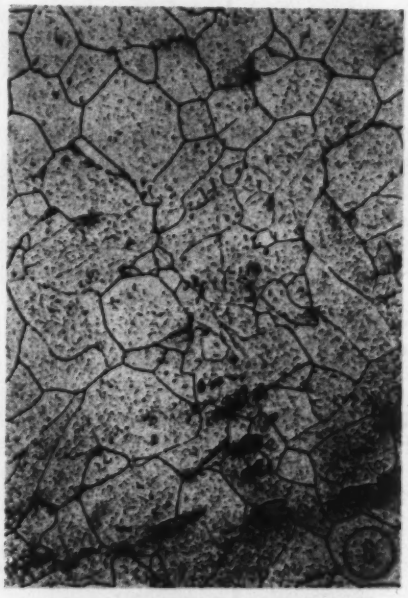

Fig. 6—50 per cent cold worked zirconium, annealed 1 hour at 1000° C, furnace cooled, X250

To verify this, two series of tests were made. In the first the metal, protected by an iron sheath, was rolled at 850° C (1560° F) to the required thickness, while in the second the sheet was worked from a starting thickness of 0.4-inch to a finished thickness of 0.062-inch at 650° C without any protection against oxidation.

Rolling at 650° C (1200° F), or above, in air produces a tenacious, hard oxide skin that must be removed before cold working. Present practice for removing this skin consists of sandblasting, followed by pickling in a lead nitrate-hydrofluoric acid solution. No evidence of hydrogen embrittlement has been encountered in using this solution.

As an illustration of the ductility of the metal and its adaptability to production methods, several wrenches were made by drop forging an annealed 9/16-inch rod under an 800-pound hammer in dies ordinarily used in the production of a nationally known chromium-molybdenum wrench. The metal worked readily at 1200 to 1290° F and produced sharp, well-filled blanks with fewer blows than were required for the alloy steel. Fig. 4 shows the forged blank before and after trimming.

Several coins about the size of a 50-cent piece have been struck, using annealed 0.062-inch sheet in coining dies designed for sheet brass. The characters on the surface were sharp and well filled. Adaptability of the metal for stamping and drawing in the production of small parts, and its amenability to forging for larger shapes, overcomes some of the restrictions imposed by the lack of suitable casting methods.

Physical Properties — Physical properties were determined on standard flat tensile specimens with a 0.5 by 0.062-inch cross section and 4-inch gage length, although the test gage section used was 2 inches. Material studied included sheet from ingot S 160 which had been rolled in a protective iron sheath at 850° C

(*Please turn to Page 96*)

2 MORE EXAMPLES

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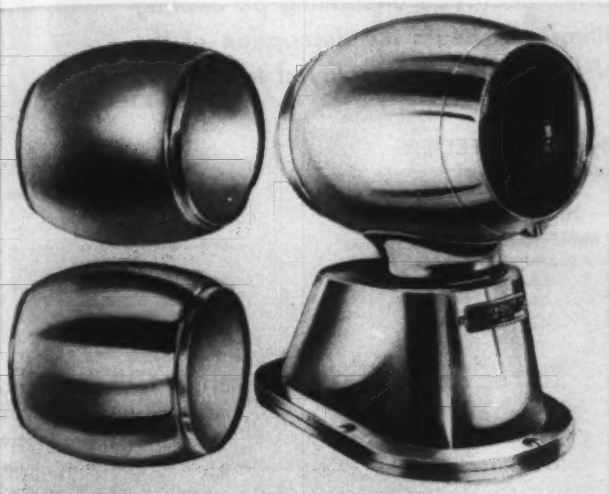
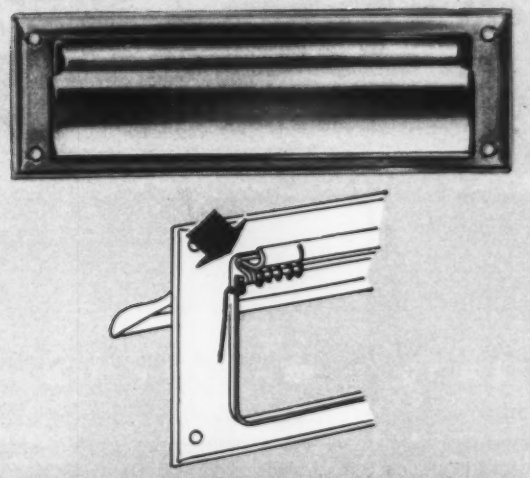
REVERE PRODUCTS and SERVICE



UPPER LEFT shows brass shell of the Rev-O-Lite as it comes from the bulging die. Without any extra finishing, which would have been necessary had shell been made of strip and brazed, shell is chrome plated as shown at lower left. At right is the completed assembly of the Rev-O-Lite ready for action on the roofs of all kinds of emergency vehicles such as police patrol cars, ambulances, fire trucks, etc. Chrome finish base is of cast zinc alloy.



THE LETTER BOX PLATE that is not only one of the first to be made from wrought brass but, the Ives Company tells us, has been generally accepted by the trade as the equal of similar items in cast brass. Another example of what can be accomplished when manufacturer and supplier work together.

Line drawing directly above shows detail of construction with Ives exclusive, Weather-Tite interlocking feature.

1. In the development of their Rev-O-Lite, a revolving warning light for emergency vehicles, the Balford Corporation, Jacksonville, Florida, found themselves faced with a production problem regarding the cylindrical shell which contains the lights. The question was; what would be the most efficient and economical way to produce this shell that measures 6″ in length and is 4½″ in diameter at the ends? Should it be formed from a metal strip and brazed? Could tube be used and bulged in a die? Or, should some other method be employed.

Revere, working with the design engineers of the Balford Corporation, exchanged ideas, weighed the pros and cons of various methods; experimented. They found that by using 70/30 Revere Brass Tube in a light anneal temper, it would take the bulging in the die satisfactorily and at the same time show up well as far as grain size control was concerned. By this method, complicated and costly forming operations and brazing could be eliminated; production speeded and the shell formed without any unsightly seam. Also, no extra hand finishing would be necessary before plating.

2. How can you make a letter box plate out of wrought brass and at the same time have it look like cast brass? This problem of the H. B. Ives Company, New Haven, Conn., came up while the Ives engineers were designing a new type plate employing a new method of interlocking the flap and the frame of the box to insure its being weather-tight.

Casting was ruled out as too costly and impractical to construct. If brass strip was used it had to be heavy enough to simulate cast hardware, yet sufficiently flexible to complete a U bend on a 7″ length without fracture or distortion. Also, because the finished plate would in most cases call for a natural brass finish, the stock had to be the right color.

After several consultations with Revere Technical Advisory Service and experiments in their own shop, it was suggested that Revere sheet brass of .062″ thickness and of a certain temper be used. That was it! The combination of proper design and heavy gauge metal resulted in a neat but rugged appearance. The wrought construction made it possible to produce a Weather-Tite plate with exclusive interlocking feature without costly machining operations. In addition, finishing costs were reduced to a minimum.

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PRODUCTION OF

Semifinished Steel

The authors continue their discussion of soaking pit heating practice, theory of rolling and begin the description of the different types of blooming mills employed today

By KARL L. FETTERS
Special Metallurgical Engineer
and
H. H. HOTTEL
Metallurgical Engineer
The Youngstown Sheet & Tube Co.
Youngstown

PART II

AFTER the ingots of a heat of steel are poured or cast, they must be allowed to partially or completely solidify before the ingot molds are removed. As an economical means of conserving the ingot's original or residual heat, the molds may be removed in some grades of steel before the ingots are completely solidified or, in other words, while the ingot's central portion is still in a liquid condition. In the early years of steelmaking, molds were removed as quickly as possible and the ingots placed in covered underground pits.

Elapsed time from their pouring until ingots are placed in the soaking pits is known as transit time. This interval is controlled as closely as possible and varies with the grade of steel being made, size and shape of the ingots, and temperature of the steel as poured into the ingot molds. Since the molds on certain grades of steels, such as high-carbon and alloy, should not be removed until the ingot is completely solidified; transit time is somewhat longer than for lower carbon steel grades. Since the rate of solidification, from the ingot's exterior surfaces, measured in inches, varies approximately as the square root of the time in minutes, an ingot 20 x 20 inches in cross-section would be completely solidified in about 100 minutes. Many factors affect the rate of solidification, but the above rule may be used to obtain an average rate. With the multitude of ingot sizes and grade of steel commonly made in a modern steel plant, transit time may vary from approximately 1 to 8 hours. As mentioned before, the most economical means of conserving heat is to charge ingots into the soaking pits while still retaining as much of their residual heat as practicable. This practice is not always possible since delays caused by breakdowns, roll changes, etc., may result in the ingots becoming cold which necessitates their being banked. When such cold ingots are charged into the soaking pits, precautions must be taken to heat very slowly to avoid their cracking. It is needless to say that much time is lost when ingots are banked. With normal or desirable transit times the temperature of ingots, when charged into the soaking pits, appears to be in the range of 1200 to 1700° F. However, the ingot's interior is considerably hotter and in fact, the central portions may still be molten or only slightly below the temperature of solidification. This practice of charging hot ingots is always desirable because if they are allowed to cool to room or atmospheric temperature, cooling strains and then heating strains (upon reheating) are created internally which may cause injurious cracks, resulting in rejection of the product after rolling.

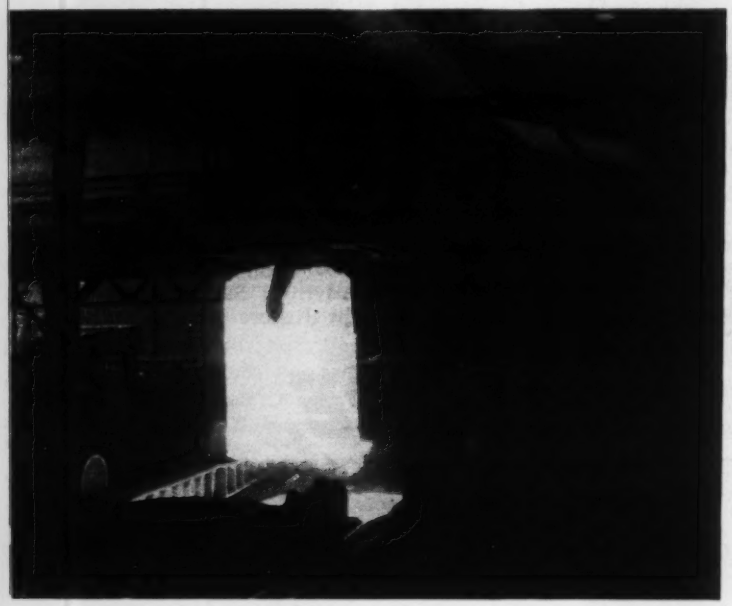
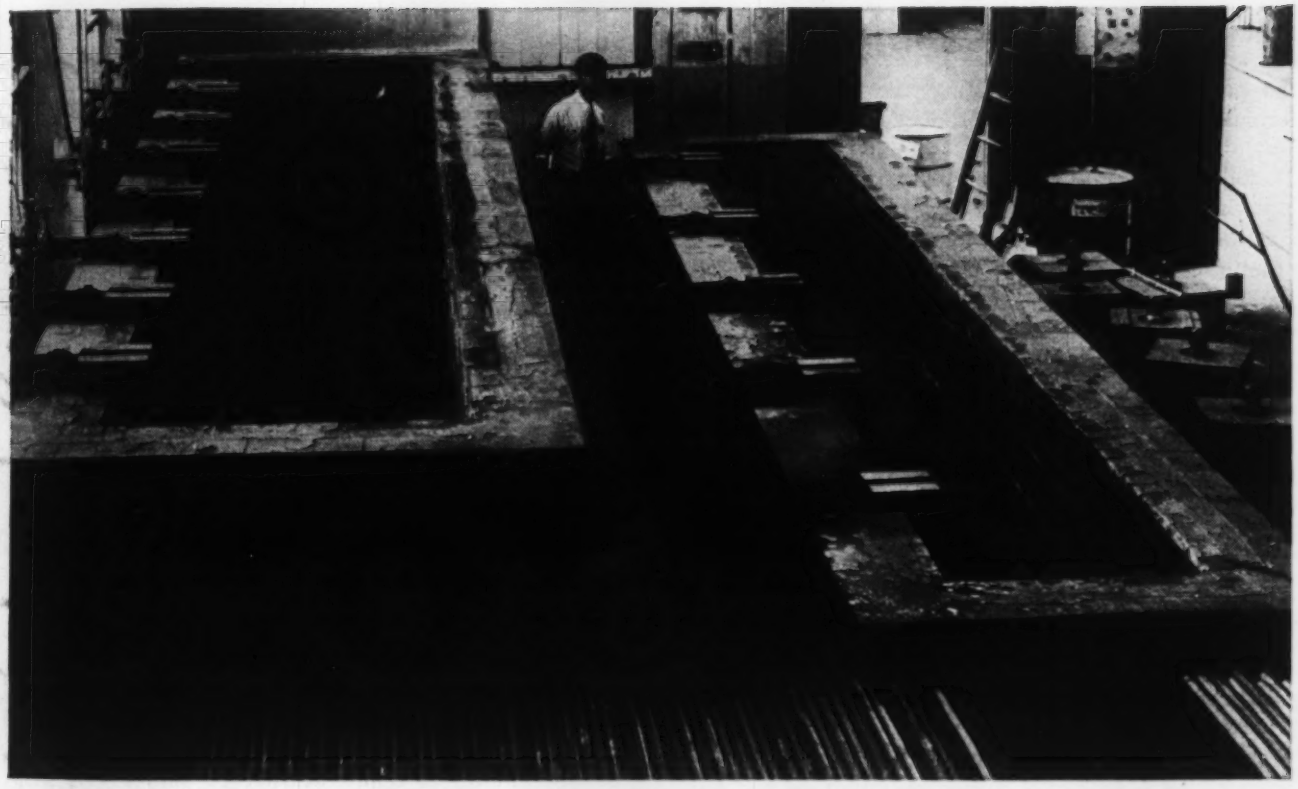


Fig. 8—Drawing a slab ingot from the soaking pits ready for rolling

HOT ACID VS. "KARBATE" IMPERVIOUS GRAPHITE



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Having traced the handling of the ingot from the time it was poured or cast to its charging in the soaking pits, we now come to one of the most important operations in the manufacture of steel products, namely, its heating prior to being rolled into blooms, billets or slabs. Importance of this operation cannot be over emphasized since improper heating practices can cause great injury to the quality of the steel being treated, in fact, it can be ruined. Some harmful effects of improper heating practices consist of overheating, underheating, nonuniform heating, and burning of the steel. Overheating and burning are closely associated since burning is caused by extreme overheating. Degree of burning may vary considerably and if carried to extremes, a temperature only slightly below the melting point of the steel may be reached. At such a temperature, certain constituents, having a lower melting point than that of the purer steel, will melt and run out of the steel leaving cavities which permit air to enter and form iron oxide around the grain boundaries. If the steel is excessively burned it is unfit for further working and must be scrapped. Underheating increases the power required for rolling and also may deleteriously affect the rolled product's surface quality. Nonuniform heating renders the steel very difficult to roll to uniform section and may also result in breaking of the rolls.

Different grades of steel require different heating practices. Some theories and treatments relating to the heating of different grades of steel for rolling are given below. Steels with different carbon contents are heated to different temperatures preparatory to rolling because the steel's analysis determines the temperature at which it will become burnt. For example, steels with the following carbon contents will be burnt if heated above the temperature shown:

Grade of Steel % Carbon	Approximate Burning Temperature ° F
0.10	2700
0.30	2630
0.50	2550
0.80	2450
1.00	2375
1.30	2250

Although the temperature to which ingots of any one grade of steel may be heated varies from plant to plant, experiments have shown that the highest practical temperature produces the best results both from the standpoint of power consumption and surface quality of the rolled products. As a result, ingots of low and medium carbon steels are usually heated to a temperature within the range of 2350 to 2450° F. High carbon (0.70 to 1.10) steels are heated between 2300 and 2350° F. Extremely low carbon open-hearth ingot iron and high sulphur re-sulphurized steels are usually heated within the range of 2400 to 2500° F. Before World War II, the temperature for rolling ingots on blooming mills was usually somewhat lower than those given just above. During the war it was necessary to increase production with available facilities and the use of higher ingot temperatures helped to accomplish this with no harmful effect on the rolled products. In fact, an improvement in surface quality was often obtained. One reason for the superior surface quality may be explained by the heavier scaling produced by the higher temperatures, since heavier scaling has a tendency to remove many superficial surface defects which may be present on ingots. This action is sometimes referred to as "washing" the steel.

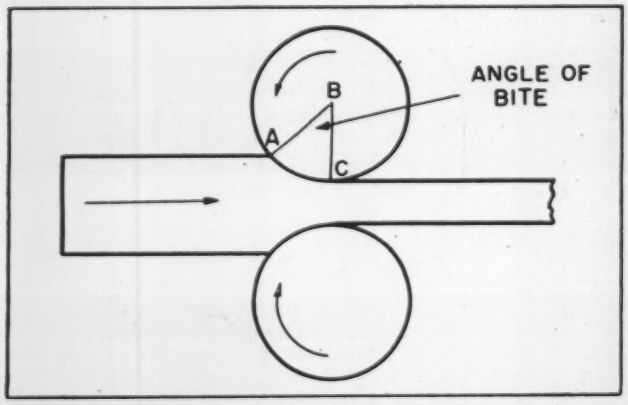

Fig. 9—Diagram showing the principle of rolling

Time required for heating of ingots for rolling varies with the temperature of the ingots when charged, grade of steel being heated, size of the ingots, and mill scheduling. Ingots charged cold should be brought up to temperature very slowly and with some grades of steel which are extremely sensitive to cracking, it may require 10 to 15 hours to properly heat them. To provide optimum rolling characteristics and obtain the desired quality of the rolled product, ingots should be held at the desired temperature in the pits for 1 hour or more. Although the minimum time in the pits may be as low as 2 or 3 hours for ingots charged hot, the average time is usually between 4 and 8 hours.

When the ingot is ready for rolling, it is drawn from the soaking pit by a traveling crane and placed on a cable operated or electrically driven ingot car or buggy which delivers and dumps it onto the entry rolls of the blooming or slabbing mill. Fig. 8 shows an ingot being drawn from the pits ready to be transferred to the blooming mill.

Before describing the various types of equipment

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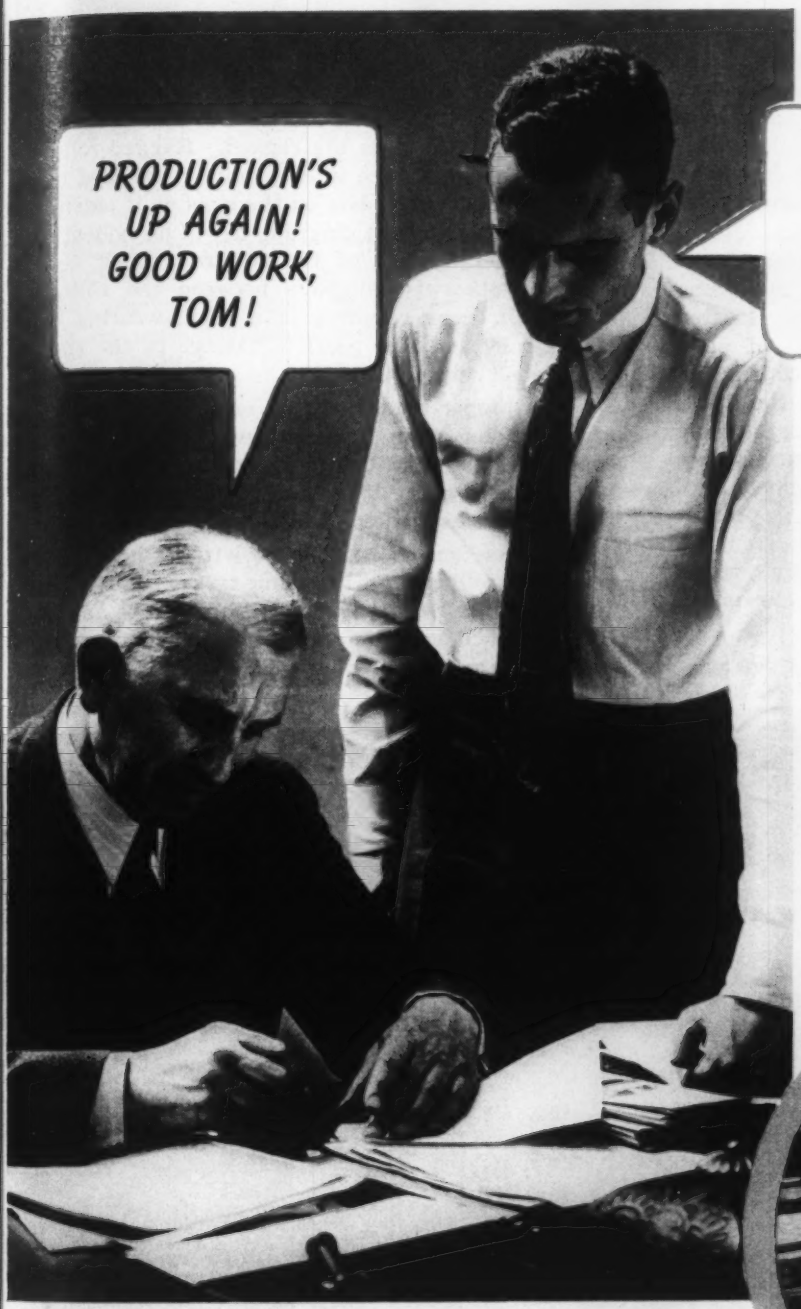

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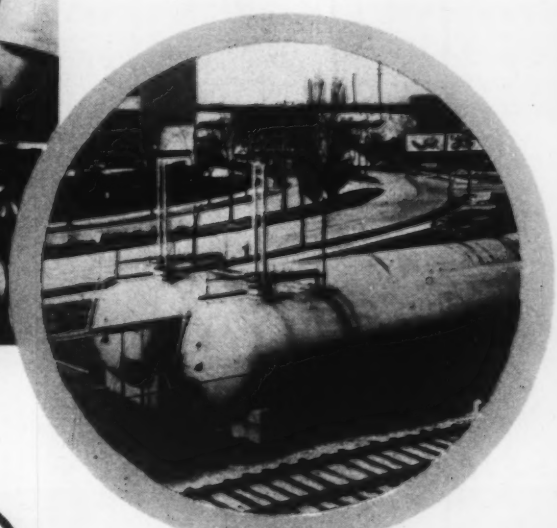

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and mills used for rolling hot ingots into blooms, billets and slabs, some of the fundamental principles or theories of hot rolling will be briefly described to enable you to better understand what actually happens in the process of any hot rolling operation. Fig. 9 shows a cross-section of a square or rectangular piece of hot plastic steel passing between two revolving rolls.

This diagram illustrates two rigidly centered rolls revolving in opposite directions with the same peripheral speed. When the delivery table, located in front of the rolls, pushes the section of steel against the revolving rolls which are set with a distance between them of somewhat less than the thickness of the entering piece, the rolls grip or bite the steel and reduce it to a thickness equal to the distance between the rolls. Except for some slight lateral spreading the reduced section is elongated in proportion to the amount of reduction.

Maximum amount of reduction possible by passing a piece of steel through a set of rolls is determined by the angle of bite. In the diagram, this is represented by the angle ABC. The maximum angle of bite at which a piece of hot steel will enter the rolls is 30 degrees if the rolls are smooth and about 38 to 42 degrees if the rolls are ragged. Ragged rolls are those which have been intentionally roughened to increase the amount of bite on the steel as it enters the rolls. In studying the diagram, it will be evident that the peripheral speed of the two rolls must be the same or otherwise slippage between the rolls and metal will occur resulting in a rapid wearing down of the rolls and also possible damage to the surface of the steel being rolled.

If the proper temperature is used in rolling a piece of steel, the grain structure will be refined, since coarse grains when deformed break up into a number of finer grains. If rolling temperature is too high, the finer grains coalesce and form larger grains.

In the section on heating we left the heated ingot ready for rolling on a blooming mill or slabbing mill. If the plant is required to roll blooms, slabs and large billets, it will be equipped with a blooming mill. If only slabs are required, it will have a slabbing mill

Fig. 10—Typical two-high blooming mill taking the first edging pass on a slab ingot

instead of a blooming mill. If small sizes of billets are required, they will have, in addition to the blooming mill, a billet mill.

There are three general types of blooming mills in use in various steel plants throughout the United States. These types, in the order of prominence, are a two-high reversing, a three-high, and a continuous. The two-high reversing mill is the most common, since many plants are required to roll a large number of various sizes and shapes of semifinished products which can be accomplished on this type of mill without roll changes. This flexibility of the reversing mill is its principal advantage over the other two types. However, the reversing type is more expensive to build and operate than the three-high type, as it is very complicated in construction, especially in regard to its power equipment. Capacity is only about one-half that of the same size three-high mill.

Reversing mills vary in size from 32 to 54 inches measured from center to center of the pinions which corresponds to the distance between the centers of the two rolls and also roughly to each roll's diameter. The average reversing mill is approximately 40 inches in size.

The top roll of reversing mills is adjustable, that is, it can be raised or lowered to accommodate various sizes of ingots, and to roll various sizes and shapes of blooms, billets or slabs. It is equipped with an electrically operated heavy screw down mechanism which allows the roller to quickly change the gap between the two rolls to the desired amount each time the piece of steel is passed between them. The distance between rolls is indicated on a large dial placed at the top of the blooming mill. Fig. 10 shows a typical two-high reversing mill taking the first edging pass on a slab ingot.

The rolls for reversing mills are very large and heavy. For example, on a 40-inch mill they measure about 33 to 38 inches in diameter and approximately 12 feet in overall length having about 6 to 7 feet of width in the main roll body. Each roll weighs 25,000 pounds or more. Depending upon the sizes and shapes of sections being rolled, the rolls are turned with different size grooves or passes. There is usually one wide groove and four or five progressively narrower grooves on each roll and each groove matches a similar groove immediately above or below on the other mating roll. In other words, both of the rolls are exact duplicates. All of the passes, except the finishing pass, are usually ragged to increase the bite and to reduce slipping as the piece of steel is started through the rolls.

Since material rolled on blooming mills is extremely large and heavy, the pull is great, and the power required to drive the rolls must be very high. Some of the older mills installed prior to 1920, are indirectly driven by large steam engines connected to the rolls through large reduction gears which enable the engine to travel at a higher speed than the rolls. In this way, power is increased in proportion to the speed ratio which in some mills is as high as 3 to 1. Practically all reversing mills installed since about 1925 are driven by reversing electric motors and many of the older mills have been converted to electric drives. These electric installations are very costly and complicated, but they markedly increase the mill's efficiency over others driven by steam engines. Electric motors are large reversing, direct current units which operate at a low speed of 40 to 50 rpm and develop from 5000 to 8000 horsepower. The reversing motor is operated in connection with a huge flywheel motor generator set, usually consisting of an induction motor and two generators.

In rolling an ingot, the top roll is raised to the proper height above the bottom roll to effect the desired reduction and the ingot is drawn or pulled through the wide groove by the two oppositely revolving rolls. After the ingot has passed entirely through the rolls, their direction is reversed, the top roll lowered slightly and the reduced ingot is pulled back through the rolls, thus further reducing its cross-sectional area and causing it to be elongated in proportion to the amount of reduction. This operation is repeated a number of times and by using the different size grooves in the rolls, the piece is reduced to the desired size. Number of times or passes through the rolls required to obtain the desired size, varies somewhat and is dependent upon the ingot size, ingot temperature, and size and shape of the rolled product. In general, the number of passes may vary between 13 and 23 but always being an odd number, since the finished rolled product is carried away from the back end of the mill, whereas the first pass started from the front end.

All reversing blooming mills are equipped with mechanical manipulators for turning the ingot as required between passes and for moving the reduced section from groove to groove as desired. The mechanism for operating the manipulators is located under the roll table on the mill's front or entering side. They consist of parallel sets of fingers which are capable of turning the ingot or partially rolled section from side to side, as it is necessary to turn the piece 90 degrees between some passes. These manipulators are electrically or hydraulically operated and controlled by the roller's assistant seated in a small pulpit located above and just in front of the mill. The entire rolling mill is operated and controlled from this pulpit by the roller and his assistant.

After receiving the last pass on the blooming mill, the rolled section (bloom, billet or slab) is conveyed on a runout table to the shears, where the section is cut to the desired length and also where any injurious piping in the steel is sheared off and discarded. Piping which may be present is revealed on the sheared ends as this condition causes a shear drag which is readily apparent to the shear operator. If piping is present the piece is resheared back a short distance and the operation repeated until all evidence of the piping is removed.

After shearing, blooms, billets or slabs are transferred to cooling beds or if it is desired to roll smaller billets from the blooms, the hot blooms are conveyed directly to a billet mill without reheating for further rolling. A modern 40-inch reversing mill is capable of rolling up to 100,000 tons of blooms, billets and slabs per month.

(To be continued)

"Prepolishing" Before Forming

(*Concluded from Page 77*)

is done by feeding the pieces between two steel rolls which have an adjustable setting under spring load to suit the different thicknesses of steel. Unless this burr is removed it will in time cut the abrasive belt of the first polishing head.

Pieces then pass successively at a travel of 45 feet per minute through the multiple polishing heads which are equipped with Minnesota Mining, cloth-backed abrasive belts coated with aluminum oxide grit progressing from coarse to fine and falling within the range of 120-240 grit. The belts are driven by 50-hp motors at a speed of 5000 fpm. The aim is to develop a surface with a microinch reading of 12-14 rms and a total of about 0.005-inch of stock usually is removed.

Each polishing head is equipped with pinch-type bottom drive rolls, rubber covered and arranged to apply pressure of about 30 psi to the sheet as it passes under the belt, backed up by a so-called "billy" roll. Belt wear is fairly rapid and is measured by an ammeter which shows the load on the drive motor. For example, a new belt under full load will give a reading of 125 amp, although the range of normal "cutting" is 80-90 amp. As the abrasive on the belt wears off the ammeter reading will drop and when it falls to around 25 amp, the head is shut down and the belt removed. Fig. 2 shows one of the polishing heads with the top cabinet enclosure removed to disclose the arrangement of the belt mounting. Note the idler roll which maintains belt tension. Belt pressure against the sheet being polished is maintained through air cylinder and is controlled through an air valve outside the machine cabinet. The top roll oscillates slightly to keep the belt tracking properly and also to change the pattern of the grain cut on the steel continuously.

Belt Life Quadrupled — In early tests, water soluble oil was used on the belts, but poor belt life suggested a change to a mineral-base cutting oil. This, in some cases quadrupled belt life. The coolant is recirculated to the belts after it has been thoroughly cleaned of all loose steel and grit by magnetic separators of the permanent magnet type and by settling. The solution is aerated to keep solids in suspension until the separators can pick them up. This arrangement prevents belts from "loading up" and resulted in a 50 per cent improvement in belt life. Temperature of the steel does not go over 100° F in the polishing operation.

Polishing heads were designed and built by the Murray-Way Corp., Detroit, and have been in a constant process of evolution and improvement since the first experimental unit was installed. They are individual units, each with its own drive motor and control equipment, although they are readily interconnected for tandem operation. As installed, they are completely enclosed in a steel cabinet, with side doors equipped with a window permitting quick inspection of the inner mechanism. Belts are changed in a matter of minutes by opening these doors, releasing the tension on the rolls, sliding the old belt off, replacing it with a spare which is stocked conveniently beside the production line, and resetting the tension.

Coating Applied—After emerging on the conveyor from the sixth polishing head, the stock is passed through a strip washer which removes all loose grit and grease and heats the steel to 200° F by means of a hot air blast drying chamber. It then passes through coating rolls which apply a protective, elastic and transparent coating of semiplastic composition.

The coating equipment was designed by the plant's own engineers and several different methods have been tried. One was to drip the coating through a series of small apertures in a feed tube onto a top rubber-covered coating roll under which the sheet passed. Another involved a line of small pressure sprays across the width of the sheet. The aim is to get a uniform layer of coating on the surface and to avoid excessive amounts of the material being applied.

There are several sources for the plastic coating material. For example, a Detroit chemical company supplies one known as Fluid-Film, described as a complex, organic, semiplastic composition, with high film strength, neutral in pH, leaving no residue or strain, nonpigmented, applied by brush, spray, roll or dip; and difficult to rupture even under intense draw stresses. The coating is a water-soluble material, applied at room temperature. It will air dry quickly and the curing or setting of the coating may be speeded up by passing the steel through a gas-fired oven at around 375° F.

Theory of the plastic coating is that it protects the polished steel through the various drawing operations, being sufficiently tough to resist die scoring of the surface by preventing metal-to-metal contact and thus avoiding the necessity of further hand polishing of formed parts before plating. The coating is readily removed by hot water after the press operations.

No Polishing Needed—Thus, rear bumper blanks, of high-strength low-alloy steel 0.108-inch thick, are prepolished, coated, formed to a complicated shape with several reverse curves in a single press operation and, after washing, are started directly into copper plating with no polishing needed. Deep-drawn bumper guards, always requiring tedious hand or automatic polishing after forming in the past, are similarly processed.

In addition to the elimination of metal-to-metal contact in the dies and its possible development of surface scoring, the flat polishing and coating system permits building up a substantial bank of flat stock ahead of the press room which is in no danger of corroding while awaiting processing. The coating, of course, is applied to only one side of the stock, that which is eventually to receive the bright or lustrous chrome plate. There is no concern over the surface finish of the underside of the blank which become the "inside" of the formed part.

Another thing, as soon as the flat stock is polished, it is possible to detect surface defects in the steel which in the past escaped attention until the part was fully formed and finished preparatory to plating. Beyond that, the coated surface is protected against possible damage in handling through the press operations. Finally, where parts previously were "polished in the form" and had sharp lines embossed in them for styling reasons, there was danger of rounding off these lines to the detriment of the original design and styling.

Future Uses—Engineers feel there may be important possibilities ahead in prepolishing or finishing in the flat, for parts other than those which are to be plated. Why, they ask, might it not be worthwhile to polish even cold-rolled sheets for body panels, to scour off that thin surface "crud" which may conceal defects which would later show up after press forming? Going a step further, would it not be advantageous to give the sheets so polished the usual "bonderizing" chemical treatment before they were stamped to shape? Such a coating would act as a die lubricant, facilitating deep drawing and lessening the danger of die scratches which now have to be rubbed out laboriously before priming and painting.

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Ductile Zirconium

(*Continued from Page* 84)

(1560° F), the sheath removed and the sheet finished by cold rolling 10, 20, 30, 40, 50, and 60 per cent reduction to 0.062-inch sheet; 50 per cent cold-worked sheet (from the same ingot), which was annealed from 400 to 1100° C (750 to 2010° F) for 1 hour and furnace-cooled; and a similar set of specimens from ingot S 159, which was rolled at 650° C (1200° F) in air before the cold rolling schedule. In addition, a number of flat specimens cut from transverse sections of the sheet were also included. Duplicate specimens annealed at 1000° C (1830° F) were quenched in brine to determine the effect of rapid cooling from above the transformation temperature.

Physical properties obtained on the cold-rolled sheet from ingot S 160 are plotted in Fig. 5. The zero work condition is represented by material which was rolled in a sheath at 850° C (1560° F) to 0.062-inch, soaked for 30 minutes at temperature, and air-cooled.

Tensile Strength Increased — Ultimate strength increased from 63,500 psi for the zero cold-worked material to 77,500 psi at 20 per cent cold work, and then continued an orderly rise to 93,500 psi at 60 per cent with no evidence of overworking. Yield strength showed a similar trend, with no retardation at 60 per cent. Proportional limit increased rapidly up to 10 per cent, leveled off up to 40 per cent, and then began a steady climb to 60 per cent cold work. Hardness increased rapidly to 20 per cent, with over 70 per cent of the total work hardening occurring within this range. Percentage of elongation drops steadily from an initial value of 14 to 8.5 at 20 per cent cold work. Constancy of the elongation and hardness, along with the continued increase of ultimate and yield strengths, indicates that the limit of cold working is somewhere beyond 60 per cent.

Values shown for 80 per cent reductions were obtained on 0.030-inch sheet, which was cold-rolled to 40 per cent reduction, then turned at right angles, and cross-rolled an additional 40 per cent. These data are included in Fig. 5, although it is realized that they may not be directly comparable because of the variation in thickness of the test specimens and the reported, but as yet unknown, change in physical properties due to directional rolling.

Effect Of Annealing Temperature —Variations of physical properties of cold-reduced sheet from ingot 160 with annealing temperature also are shown in Fig. 5. For this part of the work, test sections of 1/16-inch sheet in the 50 per cent cold-reduced condition were annealed for 1 hour in helium at temperatures ranging from 400 to 1100° C (750 to 2010° F) and furnace-cooled.

Ultimate strength drops from 86,400 psi for the unannealed material to 80,000 psi for the specimens heated at 400° C (750° F), and then declines sharply to 63,000 psi at 500° C (930° F) and 58,000 psi at 600° C (1110° F). At 500° C (930° F) the metal was still in the cold-worked condition, while the 600° C (1110° F) specimen was completely recrystallized. Thus the decrease from 400 to 500° C (750 to 930° F) is attributed to complete stress relief, and the continued but less abrupt decline from 500 to 600° C (930 to 1110° F), to recrystallization. Grain growth is rather slow, increasing from 0.015 mm at 700° C (1290° F) to 0.040 at 1000° C (1830° F), and coincides nicely with the almost constant value of 59,000 psi over the balance of the range out to 1100° C (2010° F).

Yield point values follow a trend similar to that of the ultimate strength to 800° C (1470° F). Above this temperature the values increased to 40,500 psi at 1100° C (2010° F).

Proportional limit shows only a small decrease at 400° C (750° F), dips sharply to 26,000 psi at 600° C (1110° F), rises to 28,000 psi at 700° C (1290° F), falls to a minimum of 20,400 psi at 900° C (1650° F), and then rises to 24,000 psi at 1000° C. This behavior is not unprecedented, being similar to titanium in this respect[3].

Elongation Increased—Elongation increased from 9 per cent in the cold-worked material to 14 per cent at 400° C (750° F) and 27.5 per cent at 700° C (1290° F). The minimum at 900° C (1650° F) was unexplained by grain size measurements or a comparison of other properties. At 1100° C (2010° F) the elongation was about 29 per cent.

Hardness decreased from B-96 for the cold-worked specimen to B-91 in the material annealed at 500° C (930° F), remained virtually constant to 900° C (1650° F) and then dropped to about B-85 at 1000 and 1100° C (1830 and 2010° F).

Modulus of elasticity was 13.5 x 10^6 psi over the entire range.

Zirconium metal, when rapidly cooled from above 900° C (1650° F), exhibits a martensitic structure which results from the allotropic transformation from the beta to alpha modification[4]. Fig. 2 shows a martensitic pattern of fine alpha needles in the residual beta grain boundaries, which are in sharp contrast to the polyhedral alpha grains of the furnace-cooled material shown in Fig. 6.

Effect of Hot Rolling at 650° C (1200° F) Before Cold Rolling—Sheath rolling particularly with thin sheets, is both expensive and time-consuming, and since a previous investigation[2] has shown that zirconium could be heated in air at 700° C (1290° F) for a considerable time without harmful effects, ingot S 159 was forged and rolled at 850° C (1560° F) in an iron sheath to produce a sheet 7 x 15 x 0.43 inches and then rolled at 650° C (1200° F) in air to sheet which, when cold-rolled, would finish with 10, 20, 30, 40, 50, and 60 per cent cold work at a uniform thickness of 0.062-inch for all specimens. Tensile properties are shown in Fig. 3.

A comparison of Figs. 3 and 5 shows that there are only a few differences between the physical properties of the sheet produced by the two rolling tchniques.

On the basis of experience gained

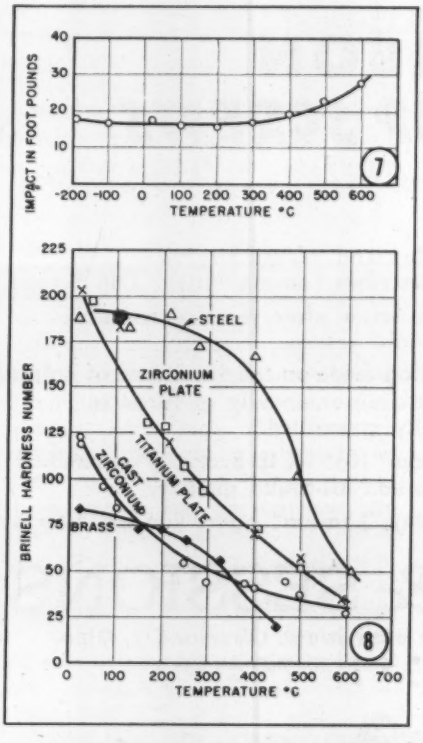

Fig. 7—Charpy (V-notch) impact strength of zirconium plate rolled at 650° C

Fig. 8—Effect of temperature on hardness of several metals

from these ingots, it appears that there is no material advantage to be gained by sheath rolling the metal at 850° C (1560° F).

Impact Tests—Impact strength determinations were made on specimens cut from sheet prepared by rolling at 650° C (1200° F) in air. All tests were made on a standard Riehle impact tester with a capacity of 220 ft-lb. Specimens were the standard ASTM, V-notch, Charpy type, 10 mm square by 55 mm long with a 45-degree V notch 2 mm deep having a root radius of 0.25 mm. With the exception of three transverse specimens taken for checks on directional properties, all of the bars were cut parallel to the direction of final rolling. Results plotted in Fig. 7 cover a temperature range from —190 to 600° C (—360 to 1110° F) and represent the average of two or more specimens at each point.

Hot Hardness—Hot hardness of zirconium was determined as a guide in forecasting the workability and strength of the metal at elevated temperatures. Measurements were made in a helium atmosphere on a Brinell hardness tester, the specimens being heated in an electric furnace mounted on tester.

Hot hardness values for cast and worked zirconium are shown in Fig. 8. For comparative purposes, the hardness versus temperature relationships for cold-rolled SAE 1020 steel, cold-rolled 70-30 brass and worked titanium are also shown. These were determined in the same apparatus and under similar conditions.

Examination of these curves shows that zirconium has the same abnormal drop in hardness as that reported for titanium by Kroll[5].

Most alloys and metals form a curve of the type exhibited by brass or steel, whether they are in the worked state as used in these experiments or in the annealed condition. The immediate decrease in the hardness of zirconium in the temperature range of 25 to 400° C (75 to 750° F) is distinctly irregular and places limitations on the operating limit of the metal, even for moderate temperature applications. Some possibilities for hot rolling zirconium can be deduced from these data. Rolling at 200° C (390° F) with warm rolls should be quite feasible, since the roll hardness is substantially unaltered, while the zirconium hardness is reduced 40 per cent.

Annealed and hot-rolled zirconium sheet can be bent 180 degrees on a 3 T radius. Cold work rapidly de-

Michigan
Electric Resistance
WELDED
STEEL
TUBING

ROUND
¼" to 4" O. D. 9 to 22 gauge

SQUARE-RECTANGULAR
½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

Can be Bent,
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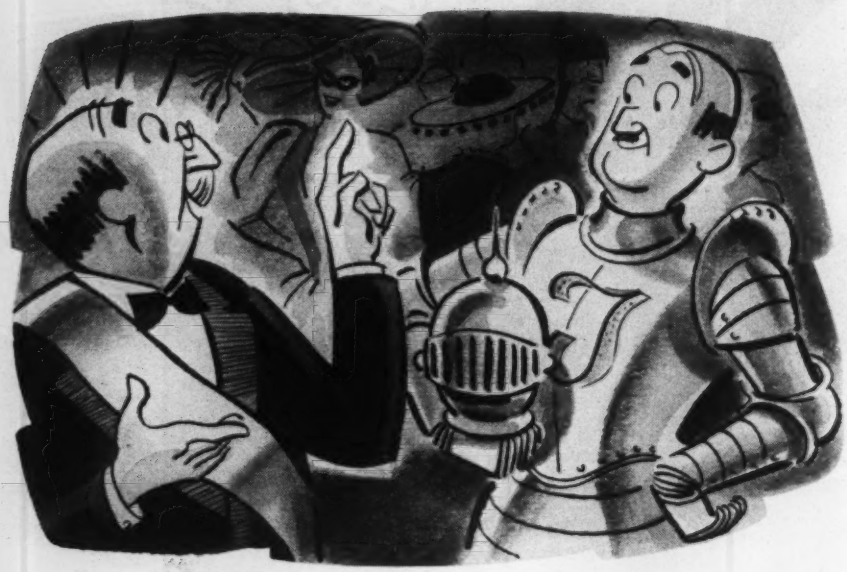

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"T" for THOMAS, of course . . . and for pre-coated *THOMAS STRIP. This ready-to-use strip steel is manufactured to fit your fabricating equipment to a "T". And, it comes to you already* pre-coated *with special finishes to make your products more Teasing, Tantalizing and Tempting to the trade.*

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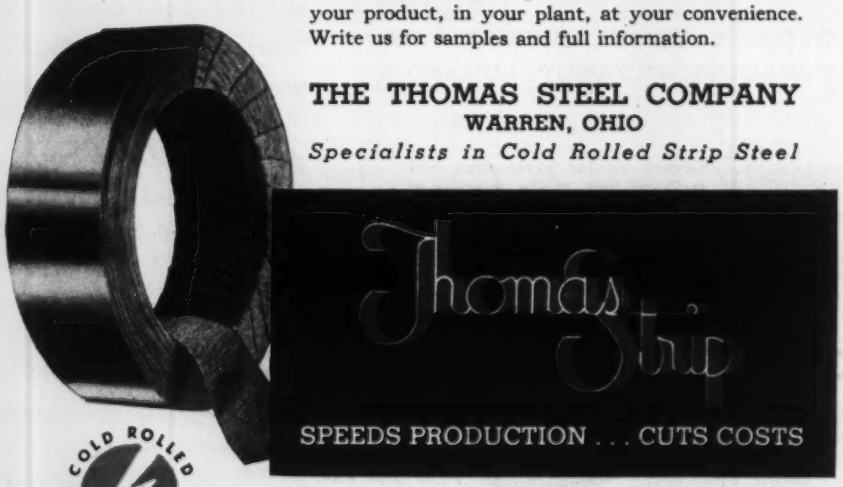

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stroys the formability—10 per cent cold work increasing the minimum bend radius to 8 T. Sheet with 20 per cent or more cold work can only be bent on a 12 to 16 T radius.

It should be noted that the values given above are on sheet prepared largely by longitudinal rolling. Since zirconium has a hexagonal structure, it may be expected to have directional properties.

Rod and Wire—Rod and wire are produced from zirconium ingots along the general outline described in the section on working. Ingots are quartered and forged at 650° C (1200° F) to a rough hexagon or square form. These forged bars can be hot or cold-worked by either swaging or rolling to produce rod of the desired size. The only limitation on reduction by hot working at 650° C (1200° F) is that occasioned by periodic cleaning of the rods to remove surface defects.

Wire is drawn in standard tungsten carbide dies. As noted by Fast, the cleaning metal is difficult to draw because of seizure in the dies. The oxide film produced by air annealing is a satisfactory lubricant for wire drawing but is extremely difficult to remove after the wire has reached the required diameter. This oxide skin, if not removed, will dissolve at elevated temperatures and embrittle the metal. Most satisfactory method of avoiding the troubles of die seizure and oxidation consists in coating the wire bar stock with a common metal, such as iron or copper. This protective sheath is then removed by pickling after the wire has been drawn to size.

Resistivity of Bureau of Mines zirconium in the form of annealed wire is 50.5 ± 0.5 microhms/cm^3 while that of hard drawn (30 to 90 per cent cold work) wire has a specific resistance of 52.0 ± 0.5. Values as high as 60 microhms/cm^3 have been found for cold drawn wire prepared from zirconium containing abnormal amounts of impurities such as iron, carbon or oxygen.

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4. F. B. Litton and B. W. Gonser, "Composition, Structure and Properties of Iodide Titanium," *Metal Progress*, Vol. 55, 1949, No. 3, p. 346-347.
5. W. J. Kroll, "Some Properties of Pure Titanium," *Metallwirtschaft*, Vol. 18, No. 4, 1939, p. 77-80.

New Products and Equipment

Higher Production Honing

Long life at high production speeds, reduced maintenance, ability to handle heavier loads and greater flexibility are features of the four-speed model MBB wet honing machine, designed by Sunnen Products Co., 7910 Manchester Ave., St. Louis 17, Mo. It uses standard Sunnen honing man-

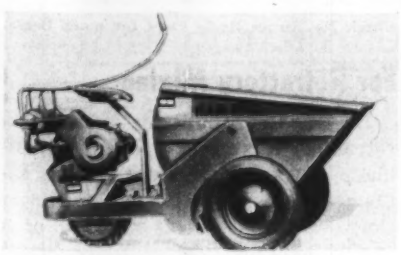
drels for sizing and finishing holes in a 0.120-2.625-inch diameter range.

Spindle is mounted on precision ball bearings which are preloaded and life-time lubricated. The self-energizing brake stops the spindle instantly, speeding loading and unloading of the work. Motor is a ½-hp capacitor, resilient base type.

Check No. 1 on Reply Card for more Details

2000 Pounds at 10 Mph

Carrying 2000 pounds or 14 cubic feet of bulk material, the Power-Cart, built by Gar-Bro Mfg. Co., 2416 E. 16th St., Los Angeles, Calif., is able to travel at speeds up to 10 mph and climb 20 per cent grades. Bulk



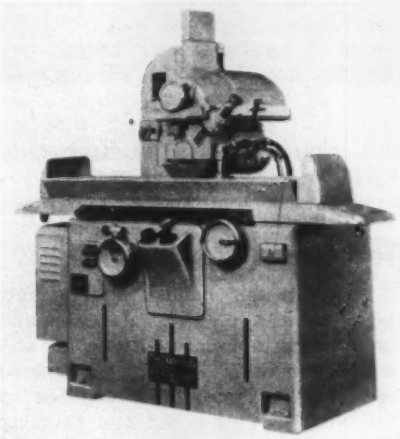
handling tray is balanced on trunnions at each side. Truck dumps or pours under the complete control of the operator. A trip-latch releases the tray and a tilt-brake holds it at any pouring angle.

Bulk tray, box or platform tray can be interchanged in less than 5 minutes. Steering and power control are by tiller. Power is furnished by a 7-hp 4-cycle engine, speed of which is controlled by a foot throttle. All moving parts are equipped with Timken roller bearings.

Check No. 2 on Reply Card for more Details

Grinder for the Tool Room

Hardened and ground sliding bearings, feed screws of the ground thread type and antifriction nuts for speed screw sensitivity are features of the 8 x 10 x 24-inch size tool room grinder offered by Thompson Grinder Co., Springfield, O. Machine has a horizontal grinding wheel spindle and reciprocating work table grinding with the wheel periphery. Maximum table movement is 29 inches, traverse 8 inches, and vertical movement 10



inches from table to underside of the 12-inch diameter wheel.

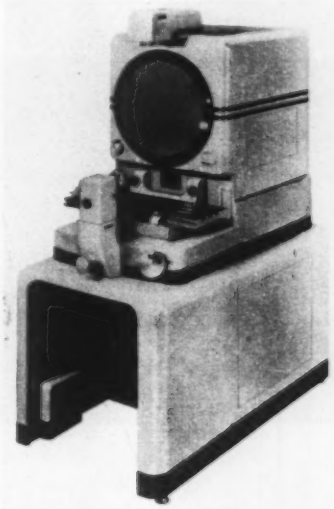
Spindle is of heat treated alloy steel mounted in four preloaded, prelubricated ball bearings. It has a 3600/1800 rpm, two-speed wheel head. Hydraulically operated table has a speed of 5 to 70 fpm. Hydraulic rapid traverse of cross feed is 240 inches per minute. Auxiliary equipment includes coolant through the wheel, magnetic chucks and control, universal contour devices utilizing 10 to 1 magnified template with diamond truing tool.

Check No. 3 on Reply Card for more Details

Contour Projector

Greater working space for efficient staging is incorporated in the contour projector known as model 2, offered by Eastman Kodak Co., Rochester 4, N. Y. The optical instrument provides a 14¾-inch work space between lamphouse and lens, regardless of magnification. Table is 20 inches long and vertical travel is 4 inches.

Eight inches of space is provided between the object under inspection and the first lens of the projection system, while additional work space has been gained by relocating the lamphouse. Surface projection has

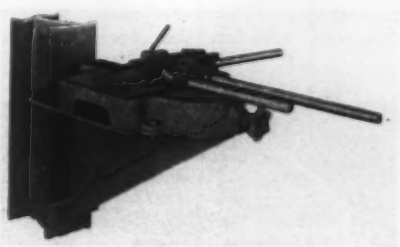


been made easier by a mirror attachment which provides surface or blind hole illumination in any of five planes. A ball-bearing mounted, six-station lens turret permits instant selection of any of six magnifications—10, 20, 31.25, 50, 62.5 and 100x.

Check No. 4 on Reply Card for more Details

Tube Benders

Production or intermittent bending of tubing may be performed in the range of ¼ to 1¼ inches by tube benders, built by Republic Mfg. Co., 1930 W. 77th St., Cleveland 2, O. The bench bender has a capacity of ⅜



to 1¼-inch tubing and may be post, bench or stand-mounted.

Hand benders No. 38 and No. 39 cover ranges of ¼ to ½ and ⅝ to ¾-inch, respectively. Tubing of soft copper, brass, aluminum, or fully annealed steel may be bent ac-

curately and to desired angles. Shapes may be bent with special radius blocks.

Check No. 5 on Reply Card for more Details

Detects Noisy Gears

Gear sets which are objectionably noisy in operation may be detected and corrected before they reach assembly by a sound tester developed by National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich.

Tester is built in two sizes, one for gears up to 14 inches in diameter

and the other for gears up to 24 inches. Tests are run at four different speeds in either direction, with or without gear loading. Machine may be equipped for air clamping to expedite loading and unloading.

Check No. 6 on Reply Card for more Details

Automatic Shaft Machine

Precut bar and tubular stock in lengths from 30 to 60 inches may be handled by a 1⅝-inch six-spindle screw machine built by Greenlee Brothers & Co., Rockford, Ill. Design permits a turning operation on the back end of the stock, eliminating a second operation. Stock is loaded into a magazine at the rear of the machine which is adjustable for various lengths, holding up to 40 bars of ¾-inch diameter material.

An air cylinder, operating a loading bar, advances the stock into the spindles where it is accurately positioned by a swing-type stock stop that is automatically cleared from the tooling area after the loading cycle is completed. At the same time the new bar is loaded into the spindle, the completed piece is moved forward into a live-roll mechanism which propels it through a sleeve in the gear box and out the front of the machine. An out-feed hopper stacks the bars and makes them available for further processing.

Check No. 7 on Reply Card for more Details

Automatic Finishing Machine

Fast indexing, variable work spindle speeds and variable time dwell are features of Super model K-46-6 indexing rotary automatic finishing machines, developed by Hammond Machinery Builders Inc., 1627 Douglas Ave., Kalamazoo, Mich. Designed to handle comparatively large work, the machines have an infinitely variable production range from 150 to 1700 indexes per hour. The wide range of head styles available have 3 to 15 hp drives.

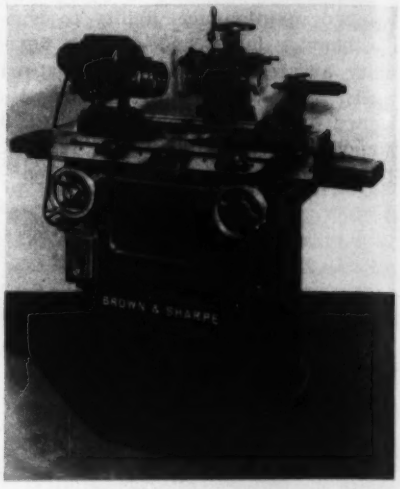
An automatic table lock positions the table rigidly and accurately during the dwell period. Air-operated head lifters raise the wheel from the work before indexing. A safety foot control permits the operator to hold the table at dwell position.

Check No. 8 on Reply Card for more Details

Tool Grinding Machine

Straight and helical milling cutters, formed cutters, straddle and face mills, angular cutters of any angle, end mills, straight or tapered reamers, etc., may be sharpened on the No. 10N cutter and tool grinding machine, offered with universal equipment by Brown & Sharpe Mfg. Co., Providence 1, R. I. Fixed height of the machine gives easy visibility of wheel and work from the operating positions. Sensitive controls are easily operated and are located for access from front, right rear or left rear of the table.

Double-ended antifriction wheel spindle may be swiveled in the horizontal plane. Transverse movement screw mounted directly above the V-way and precision ground steel rollers on flat-way eliminate tendency of the carriage to twist. Wheel spin-



dle motor and driving mechanism are enclosed in the base. A wide selection of attachments increases machine's versatility for the sharpening of the various types of tools.

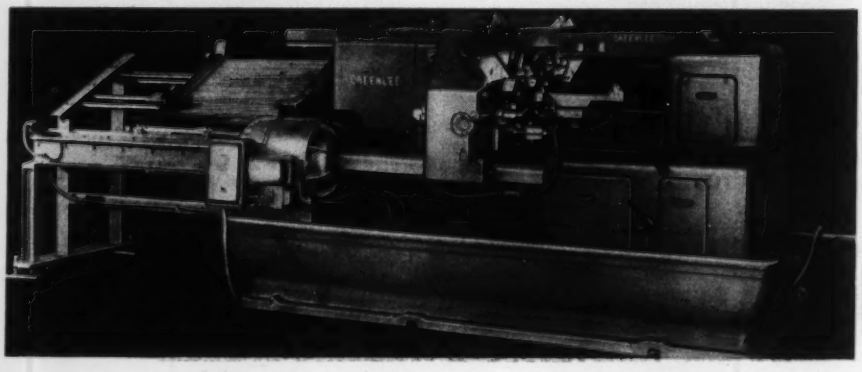
Check No. 9 on Reply Card for more Details

Various Electrodes Handled

Capable of handling all alternating or alternating-direct current electrodes from 1/16 to 3/16-inch inclusive is the engine driven, combination alternating current arc welder and 3 kw power plant built by Miller Electric Mfg. Co., Appleton, Wis. Unit is offered either as a stationary model or a completely portable unit on a rubber-tired truck. It is capable of delivering 200 amp of welding current.

Another use may be for pipe thawing, the high cycle alternating current thawing pipes rapidly. For power, the machine provides 3 kw, 110/220 v ac, 60 cycle, single phase current. Generator is powered by an Onan 2-cylinder, 4-cycle air cooled engine.

Check No. 10 on Reply Card for more Details



For Refractory Mixing

Designed and built for open hearth refractory mixing is a portable multiblade mixer with skip loader, announced by Multiplex Machinery Corp., Elmore, O. It consists of a mixer mounted on a four-wheeled pneumatic-tired truck which may be moved to any open hearth location. Lifting hook allows it to be conveyed by overhead cranes. Skip loader facilitates loading.

Standard wheelbarrows may be lo-

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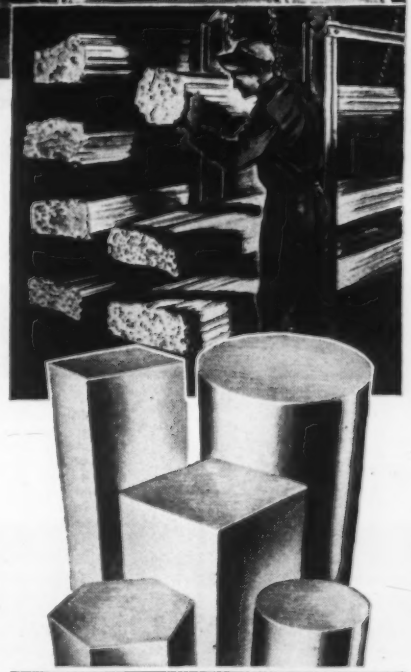


Hundreds of machine shops report . . . Longer Tool Life . . . Better Finish . . . Faster Operation—when they use J&L "E" Steel, the amazing new **bessemer screw stock** for fittings . . . nuts . . . bolts . . . shafts . . . rollers and similar products.

J&L "E" Steel is available in standard shapes and in three grades: E-15, E-23 and E-33, each within the composition limits of standard bessemer screw steels with similar tensile properties.

Your steel distributor will be glad to deliver *J&L "E" Steel.* He knows that once you start using this free-cutting steel, you'll want more.

Users have obtained machinability ratings as high as 170 with J&L "E" Steel!

Your Steel Distributor is Your STEEL SERVICE CENTER for

—QUICK DELIVERIES

—WELL-ASSORTED STOCKS

—HIGH QUALITY COLD FINISHED STEEL

Write us for the name of the nearest steel distributor of J&L "E" and other J&L cold finished steels . . . Also let us send you our new booklet: *"Faster Machining . . . Smoother Finish . . . Longer Tool Life."*

Any part machined from bessemer steel can be made better from "E" Steel.

"E" Steel (U. S. Pat. No. 2,484,231) is easily identified by the distinctive blue color on the end of every bar.

Jones & Laughlin Steel Corporation
404 Jones & Laughlin Building
Pittsburgh 30, Pa.

☐ Please send me the name of the nearest J&L "E" Steel distributor.

☐ Also a copy of *"Faster Machining . . . Smoother Finish . . . Longer Tool Life."*

NAME_____

COMPANY_____

ADDRESS_____

JONES & LAUGHLIN STEEL CORPORATION

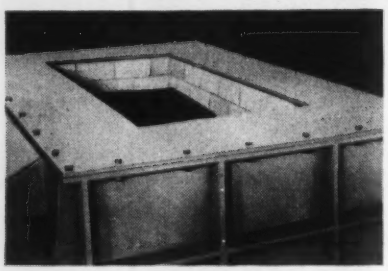
From its own raw materials, J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

GALVANIZING by induction *

Seven ton capacity Ajax Low Frequency Induction Furnace now in use for Hot Dip Galvanizing.

another AJAX First



Showing the heavy refractory brick lining walls containing the molten zinc. No iron kettle is used.

Now Ajax engineers have developed a galvanizing furnace lined with an inert refractory material. The melt is internally heated by the electric induction principle introduced by Ajax more than thirty years ago. Costly iron kettle replacements and dross formation from iron kettle are eliminated. Internal circulation assures complete uniformity of temperature.

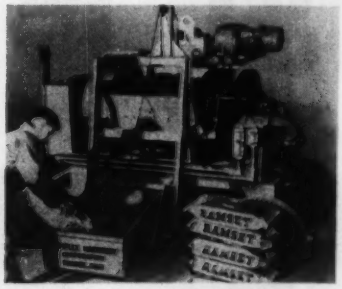
* FASTER PRODUCTION • UNIFORM QUALITY
LESS MAINTENANCE • LOW OPERATING COST
ABSOLUTE TEMPERATURE CONTROL • LONG
LIFE • REDUCED DROSSING • NO HOT SPOTS
SMALLER ZINC BATH POSSIBLE

AJAX ENGINEERING CORPORATION
TRENTON 7, N. J.

AJAX TAMA-WYATT INDUCTION MELTING FURNACE

Associate Companies: AJAX METAL COMPANY, Non-Ferrous Ingot Metals and Alloys for Foundry Use
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

cated at the opposite side for receiving the mixed material. Unit is of all steel construction with shafts operating in antifriction bearings.

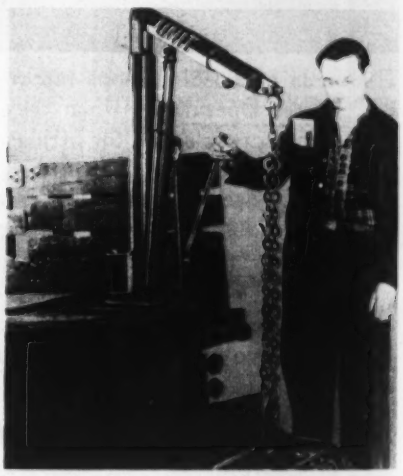


Drive is through V-belts. Front wheels turn and are equipped with pulling tongue. Mixers are offered in 3, 5, 7 and 12 cu ft capacities.

Check No. 11 on Reply Card for more Details

Truck and Shop Hoist

Useable on a three-wheel tubular steel floor frame or on truck beds, work benches or loading docks is the utility hydraulic truck and shop hoist, announced by Unit Mfg. Co., Minneapolis, Minn. Maximum load of ¾-ton may be lifted 77½ inches in



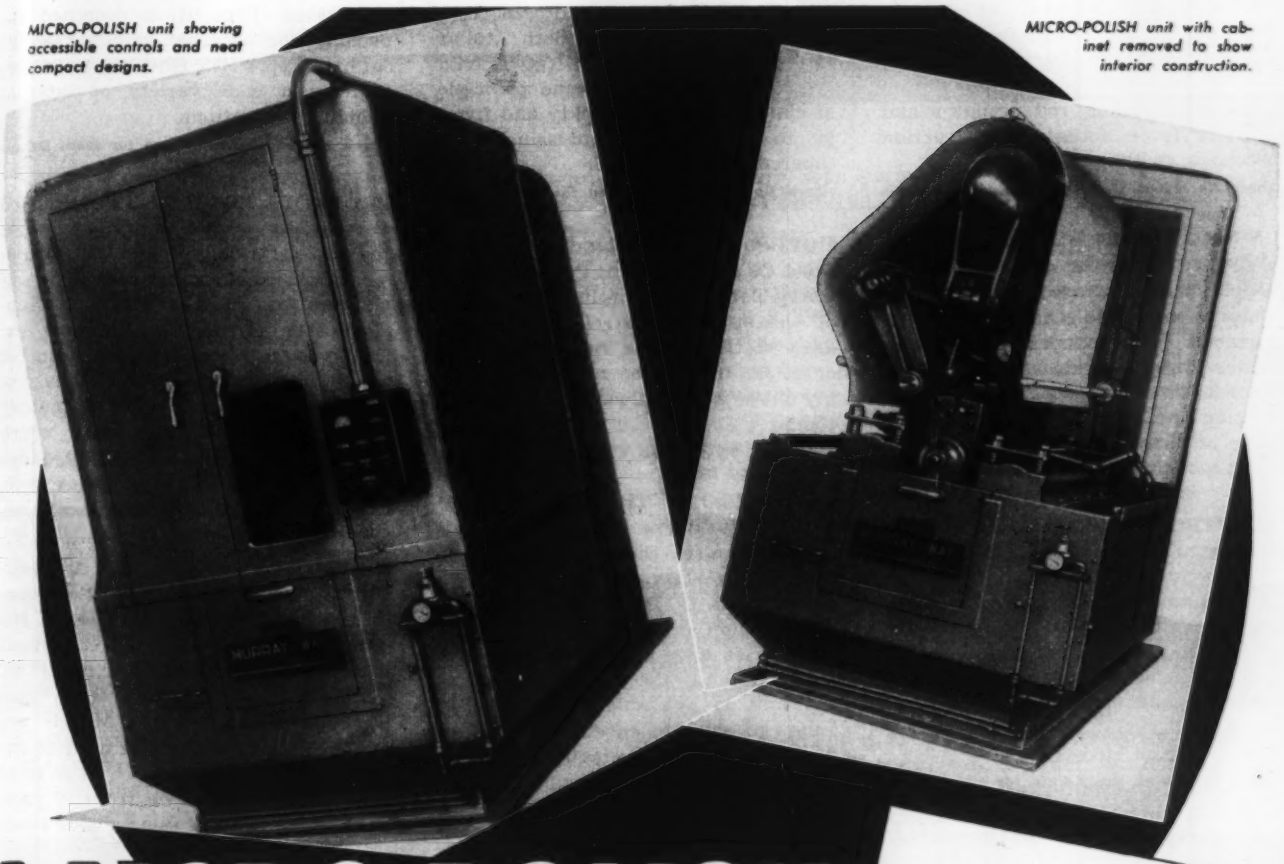
45 seconds. By using a short hook-up, 2000 pounds may be lifted 52 inches in the same time.

A double action hand operated hydraulic pump powers the hoist. When removed from the truck bed, the hoist leaves a surface smooth enough for other operations. When mounted on a truck, the 45-inch boom will swing in a full circle. Wheels on the floor frame are equipped with needle bearings which will not bind while rolling.

Check No. 12 on Reply Card for more Details

• • •

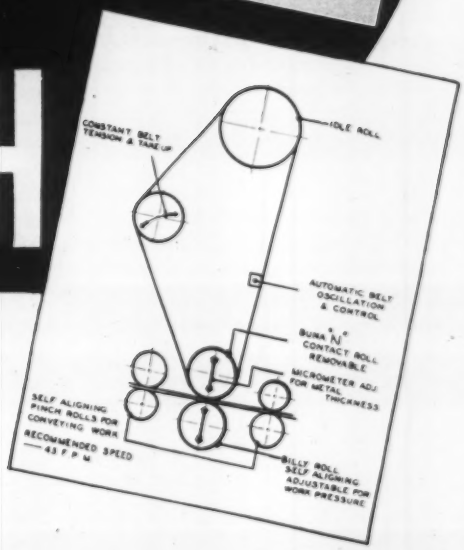
CUTS POWER CIRCUIT: For automatically cutting off the power circuit when a high frequency cabinet



MICRO-POLISH unit showing accessible controls and neat compact designs.

MICRO-POLISH unit with cabinet removed to show interior construction.

MICRO-POLISH

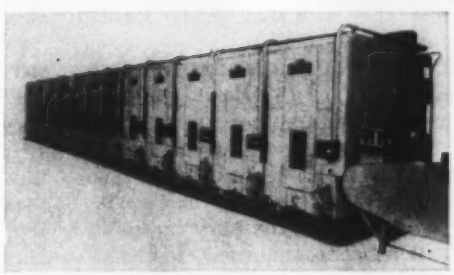

CONSTANT BELT TENSION & TAKE-UP
IDLE ROLL
AUTOMATIC BELT OSCILLATION & CONTROL
BURN "N" CONTACT ROLL REMOVABLE
MICROMETER ADJ. FOR METAL THICKNESS
SELF ALIGNING PINCH ROLLS FOR CONVEYING WORK
RECOMMENDED SPEED 43 F P M
BILLY ROLL SELF ALIGNING ADJUSTABLE FOR WORK PRESSURE

An outstanding system of sheet-grinding and polishing proved-right in actual operation.

You too, will like MICRO-POLISH because...

- Gives higher quality surface for any given grain size.
- Much faster grinding rate without burning.
- Greater operating economy.
- Handles sheet, strip or blanked parts, any width or length.
- It's a wet or dry process.
- Convenient, reliable controls carefully protected from abrasives and foreign matter.

We also manufacture a complete line of buffing and polishing equipment to handle any contour or formed parts. Inquiries are invited.



A typical 12 unit MICRO-POLISH installation.

MURRAY WAY

THE MURRAY-WAY CORPORATION

3925 WEST FORT STREET • DETROIT 16, MICHIGAN

AUTOMATIC POLISHING, BUFFING, GRINDING EQUIPMENT

door is opened, a small door interlock switch assembly has been developed by Micro Switch, Freeport, Ill. It consists of a combination mounting bracket, rod actuator and a roller lever actuated snap action precision switch.

Check No. 13 on Reply Card for more Details

INFRARED SPECTROPHOTOMETER: Known as model 21, a new double beam infrared spectrophotometer with a wide range of operating variables is introduced by Perkin-Elmer Corp., Glenbrook, Conn. It records directly in per cent transmission against a linear wave length scale on large, easily read charts.

Check No. 14 on Reply Card for more Details

ELECTRODE FOR ALUMINUM: For aluminum and aluminum alloys, the new welding electrode Eutectrode 2101, is announced by Eutectic Welding Alloys Corp., New York 13, N. Y. It has a tensile strength of 34,000 psi. The electrode does not spatter and stop and start welding presents no difficulties. It is available in 1/8 and 3/16-inch sizes.

Check No. 15 on Reply Card for more Details

FRACTIONAL HP MOTOR: E.M.C. model 1100, announced by Electric Motor Corp., Racine, Wis., is a dynamically balanced single shaft fractional horsepower motor. It is a brush type universal motor of 1/20-hp intermittent duty and 1/25-hp continuous duty.

Check No. 16 on Reply Card for more Details

RETAINS HEAT: Carey Tempchek, a new improved heat insulation in pipe covering and block form for temperatures to 1500° F, has been developed by Philip Carey Mfg. Co., Cincinnati 15, O. It consists of silicas, combined with asbestos fibers and bonding agents. It forms tight joints, is nonirritating, noncorrosive and easy to apply.

Check No. 17 on Reply Card for more Details

DRILLS FOR HARDENED STEEL: Black Drill Co., Cleveland, O., announces a new and improved Hardsteel drill for the drilling of hardened and work-hardening steels. Improvement results from a change in the formulation of the alloy material itself. Drill has improved tortional strength which permits wider latitude in drilling pressures.

Check No. 18 on Reply Card for more Details

COMBINATION GROOVE SHEAVES: Extension of the Magic-Grip sheave line to include A-B combination groove sheaves in sizes from 3 to 38 inches, one to six grooves, is announced by Allis Chalmers Mfg. Co., Milwaukee, Wis. Both collar (style C) and noncollar (style NC) types operate on the same principle of clamping sheave quickly and firmly to shaft by compressing split tapered bushing sleeve.

Check No. 19 on Reply Card for more Details

HOLDS TOOLS: Standard Pressed Steel Co., Jenkintown, Pa., offers the Carry-Tool, an easy rolling unit made of heavy gage steel with large drawers that hold a full complement of tools. It may be used on assembly lines, at machines or in the tool room.

Check No. 20 on Reply Card for more Details

FOR SMOOTH TRAVEL: For use with all hook-type electric and hand-operated hoists, the Rocket trolley is offered by David Round & Son, Cleveland 5, O. Trolley is of all steel construction and the sealed ball bearing wheels have deep flanges to prevent climbing the track. Self-aligning unit is available in a complete range of sizes to cover capacities of ¼-ton up to 2 tons and for use on I-beams from 4 to 12 inches.

Check No. 21 on Reply Card for more Details

BOSUN'S CHAIR: Painting, repairs and inspection of elevated work are facilitated by the new foot-operated bosun's chair made by Safway Steel Products Inc., Milwaukee 13, Wis. The one-man platform hoist consists of a rigid tubular steel cage that is moved by a winch.

Check No. 22 on Reply Card for more Details

ALL-STEEL FAIRLEADER: With a throat large enough to pass a joint made up with Crosby wire rope clips, a new, all-steel fairleader is introduced by American Hoist & Derrick Co., St. Paul 1, Minn. Sheave and head are mounted on antifriction bearings. Sizes are available for ⅝, 1 and 1½-inch wire rope.

Check No. 23 on Reply Card for more Details

MOVES DRUMS: A drum dolly that can be used for moving all standard 55 gallon steel drums is announced by Quinn Products Co., Chicago 21, Ill. Three individually mounted, ball bearing full swivel casters are used. Overall size of the dolly is 21 x 21 x 21 inches.

Check No. 24 on Reply Card for more Details

GRINDER SPINDLES: A new line of precision grinding spindles for use on all standard types of grinders is announced by Maxwell Co., Bedford, O. Featuring Fafnir bearing construction throughout, spindles facilitate high speed precision grinding operations. Type H is designed especially for external grinding applications. Types H-3, H5-1-1½ and H5-2, perform a wide variety of internal grinding operations.

Check No. 25 on Reply Card for more Details

PROTECTS EQUIPMENT: Designed as a safety device to protect water cooled electrically operated equipment, a new electrical control is announced by Electro Chemical Supply & Engineering Co., Emmaus, Pa. Esto water control can be adjusted to operate at any water flow the equipment requires. If water supply fails, a weighted lever falls which opens the circuit and relay stops equipment, sounds an alarm or both.

Check No. 26 on Reply Card for more Details

TIME CLOCK: Operating by self-starting, synchronous motor or controlled by a master clock, series 800 payroll recorder, made by Cincinnati Time Recorder Co., Cincinnati 14, O., automatically prints time upon insertion of time card. Models are available to print up the card to facilitate subtraction; others print down or across and on front of card.

Check No. 27 on Reply Card for more Details

CONVERTS FROM LIMIT TO DIAL: Designated as the Dializer, a device to convert ordinary AGD snap gages to dial instruments is announced by Standard Gage Co. Inc., Poughkeepsie, N. Y. It is inserted in place of two gaging pins of American gage design adjustable limit snap gages. It is available for frames No. 1 through No. 6 and will go in any model, A, B or C and in any make of frame if in accordance with AGD specifications.

Check No. 28 on Reply Card for more Details

EASY MOVING: Feather-Lite, a new light weight Wheel-Ezy hand truck, is offered by Rapids-Standard Co. Inc., Grand Rapids, Mich. It has a capacity load rating of 400 pounds. A tubular step-climber prevents wheels from catching on overhang of stair treads when moving loads between floors. Unit has 10-inch pneumatic or 8-inch molded-on rubber wheels.

Check No. 29 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Market Summary

STEEL mill order backlogs are increasing in virtually all products. Bookings are especially heavy in the light, flat-rolled items and pipe. But carbon bars, plates, structurals and wire goods are under increased pressure. Even the specialties, such as stainless sheets and strip, are in noticeably stronger demand. Not only are consumers specifying actively for inventory, but volume is rising seasonally in some consuming lines.

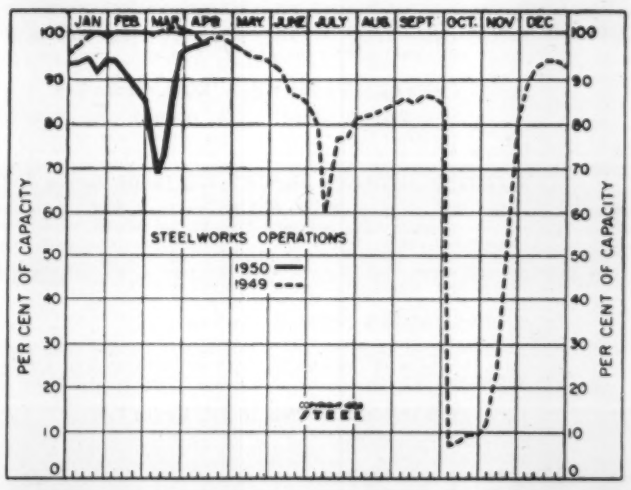
OUTLOOK— Automative requirements are undiminished. Building needs are expanding. Farmers are taking larger tonnage. Agricultural implement makers are specifying more actively. Railroad carbuilding is rising. Road machinery and other heavy equipment builders are pressing for shipments. Foundries are busier and are ordering more pig iron. All of which adds up to an unusually strong market condition with mill deliveries extending into summer assuring high-level steelmaking well into third quarter. So promising is the outlook, trade opinion increasingly expects no serious letdown in activity this year, barring grave automotive labor trouble. This is a significant reversal of view held a few weeks ago.

PRODUCTION— In the first quarter this year steel output ran about 7 per cent behind that in the like period of 1949. This is considered highly satisfactory considering operating difficulties in February and March due to the coal strike. Production in the three months totaled 22,169,924 net tons with operations averaging 90.4 per cent of capacity. This compares with 24,052,146 tons and 101.5 per cent of capacity in the like period last year. March production, 7,446,307 tons, was up about 9 per cent from February but was down about 11 per cent from March, 1949. Continuance of the first quarter rate of output through the remainder of the year would make 1950 one of the best years in history with output exceeding 88 million tons. That figure was topped in only three years, 1948, 1944 and 1943.

OPERATIONS— Steelmaking operations increased ½ point last week to 98 per cent of capacity. This is equivalent to production of about 1,868,000 tons. It compares with 1,828,000 tons in the like week a year ago and with a weekly average of 1,281,210 tons in 1940, highest prewar year. District operations last week went up 7 points to 87 per cent in New England, 2 points to 93 in eastern Pennsylvania, and 2.5 points to 99.5 in Cleveland. From revised rates the ingot rate was off 1.5 points to 100 in Pittsburgh and 3 points to 99 in Chicago.

SUPPLY—Order accumulations on mill books would be heavier currently except for limitations on bookings imposed by producers. This is especially true of sheets and pipe. Some makers of sheets are out of the market entirely. Shipments extend through July on the major carbon grades and the carryover from second quarter is expected to take up a good part of the third quarter production. In fact, with due allowance for arrearages and production loss due to summer vacations, sheetmakers estimate they will have only a few weeks output available for new business in third quarter. So tight is the supply situation in flat-rolled consumers are turning in larger number to the conversion market. Imported steel is being looked upon with increasing favor.

PRICES— Stability continues in all sections of the steel market pricewise. Other producers are considering adopting new extras announced a week ago on hot strip by Inland Steel Co. Otherwise the price situation is featureless. STEEL's price composite on steelmaking scrap is fractionally higher at $29.08. On finished steel, the arithmetical composite holds at $93.18 as does the weighted index at 156.13. Pig iron composites are steady with No. 2 foundry, $46.47, basic, $45.97, and malleable, $47.27.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Apr. 15	Change	Same Week 1949	Same Week 1948
Pittsburgh	100	— 1.5*	98	72
Chicago	99	— 3*	100	86.5
Eastern Pa.	93	+ 2	94	61
Youngstown	105	0	105	50
Wheeling	102.5	0	95.5	82
Cleveland	99.5	+ 2.5*	100.5	96
Buffalo	104	0	104	64
Birmingham	100	0	100	41
New England	87	+ 7	88	80
Cincinnati	102	0	104	85
St. Louis	84.5	0	84.5	89.5
Detroit	106	0	110	101
Western	95	0	101.5	..
Estimated national rate	98	+ 0.5	99	73

Based on weekly steelmaking capacity of 1,906,267 net tons for 1950; 1,843,516 net tons for 1949; 1,802,476 net tons for 1948.
*Change from revised rate.

News Summary—p. 45 *Production-Engineering News—p. 75*

Composite Market Averages

	Apr. 13 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)	156.13	156.13	156.13	154.01	100.65
Index in cents per lb...	4.230	4.230	4.230	4.172	2.727
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$93.18	$93.18	$93.18	$94.50	$57.55
No. 2 Fdry Pig Iron, GT	46.47	46.47	46.47	46.63	24.67
Basic Pig Iron, GT.....	45.97	45.97	45.97	46.22	24.00
Malleable Pig Iron, GT..	47.27	47.27	47.27	47.34	25.29
Steelmaking Scrap, GT..	29.08	28.83	28.00	24.08	19.17

Weighted finished steel index based on average shipments and prices of the following 14 representative products during 5-year base period 1935-39: Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Apr. 13 1950	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.45	3.45	3.45	3.35	2.15
Bars, H.R., Chicago	3.45	3.45	3.45	3.35	2.15
Bars, C.F., Pittsburgh	4.10–15	4.10–15	4.10–15	3.95	2.65
Shapes, Std., Pittsburgh ..	3.40	3.40	3.40	3.25	2.10
Shapes, Std., Chicago	3.40	3.40	3.40	3.25	2.10
Plates, Pittsburgh	3.50	3.50	3.50	3.50	2.20
Plates, Chicago	3.50	3.50	3.50	3.40	2.20
Plates, Coatesville, Pa. ..	3.60	3.60	3.60	3.75	2.20
Plates, Sparrows Point, Md.	3.50	3.50	3.50	3.45	2.20
Plates, Claymont, Del. ...	3.60	3.60	3.60	3.65	2.20
Sheets, H.R., Pittsburgh ..	3.35	3.35	3.35	3.25	2.20
Sheets, H.R., Chicago ....,3.35	3.35	3.35	3.25	2.20	
Sheets, C.R., Pittsburgh ..	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Chicago	4.10	4.10	4.10	4.00	3.05
Sheets, C.R., Detroit	4.30	4.30	4.30	4.20	3.15
Sheets, Galv., Pittsburgh .	4.40	4.40	4.40	4.40	3.65
Strip, H.R., Pittsburgh ...	3.25	3.25	3.25	3.50	2.10
Strip, H.R., Chicago	3.25	3.25	3.25	3.25–30	2.10
Strip, C.R., Pittsburgh ...	4.15	4.15	4.15	4.00–75	2.80
Strip, C.R., Chicago	4.30	4.30	4.30	4.00–25	2.90
Strip, C.R., Detroit	4.35–40	4.35–40	4.35–40	4.20–50	2.90
Wire, Basic, Pittsburgh ..	4.50	4.50	4.50	4.15	2.60
Nails, Wire, Pittsburgh ..	5.30	5.30	5.30	5.20	2.80
Tin plate, box, Pittsburgh.	$7.50	$7.50	$7.50	$7.75	$5.00

SEMIFINISHED

Billets, forging, Pitts.(NT)	$63.00	$63.00	$63.00	$61.00	$40.00
Sheet bar, mill (NT)	57.00–58.00	57.00–58.00	57.00–58.00	67.00	34.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$", Pitts...	3.85	3.85	3.85	3.775	2.00

PIG IRON, Gross Ton

Bessemer, Pitts.	$47.00	$47.00	$47.00	$47.00	$25.50
Basic, Valley	46.00	46.00	46.00	46.00	24.50
Basic, del. Phila.	49.44	49.44	49.44	49.39	26.34
No. 2 Fdry, Pitts.	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, Chicago	46.50	46.50	46.50	46.25	25.00
No. 2 Fdry, Valley	46.50	46.50	46.50	46.50	25.00
No. 2 Fdry, del. Phila. ..	49.94	49.94	49.94	49.89	26.84
No. 2 Fdry, Birm.	42.38	42.38	42.38	43.38	21.38
No. 2 Fdry. (Birm.)del.Cin.	49.08	49.08	49.08	49.43	25.06
Malleable, Valley	46.50	46.50	46.50	46.50	25.00
Malleable, Chicago	46.50	46.50	46.50	46.50	25.00
Charcoal, Lyles, Tenn. ...	60.00	60.00	60.00	66.00	33.00
Ferromanganese, Etna, Pa.	175.00	175.00	175.00	163.00	140.33*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts...	$32.25	$32.25	$32.00	$25.00	$20.00
No. 1 Heavy Melt. E. Pa..	26.00	25.25	24.00	23.25	18.75
No. 1 Heavy Melt. Chicago	29.00	29.00	28.00	24.00	18.75
No. 1 Heavy Melt. Valley..	32.75	32.75	31.75	23.00	20.00
No. 1 Heavy Melt. Cleve. .	29.25	29.25	28.25	21.00	19.50
No. 1 Heavy Melt. Buffalo	29.75	29.75	28.25	24.75	19.25
Rails, Rerolling, Chicago..	46.50	46.50	45.50	32.50	22.25
No. 1 Cast. Chicago	41.00	41.00	41.00	29.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl...	$14.25	$14.25	$14.25	$14.50	$7.00
Beehive, Fdry., Connlsvl...	16.00	16.00	16.00	17.00	7.75
Oven Fdry., Chicago	21.00	21.00	21.00	20.40	13.35

NONFERROUS METALS

Copper, del. Conn.	18.50	18.50	18.50	23.375	12.00
Zinc, E. St. Louis	10.50	10.50	9.75	15.00	8.25
Lead, St. Louis	10.30	10.30	10.80	14.825	6.35
Tin, New York	76.00	76.00	74.75	103.00	52.00
Aluminum, del.	17.00	17.00	17.00	17.00	15.00
Antimony, Laredo, Tex. ..	24.50	24.50	24.50	38.50	14.50
Nickel, refinery, duty paid.	40.00	40.00	40.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$48.00	$48.50	$49.00	$49.50
Newark,del.	50.63	51.13	51.63	52.13
Brooklyn,N.Y.,del.	....	52.79	53.29	....
Birmingham District				
Birmingham R2	41.88	42.38	....	....
Birmingham S9	41.88	42.38	....	....
Woodward,Ala. W15	41.88	42.38	....	....
Cincinnati,del.	....	49.08	....	....
Buffalo District				
Buffalo H1, R2	46.00	46.50	47.00	....
Tonawanda,N.Y., W12	46.00	46.50	47.00	....
N.Tonawanda,N.Y., T9	....	46.50	47.00	....
Boston, del.	55.26	55.76	56.20	....
Rochester,N.Y.,del.	48.63	49.13	49.63	....
Syracuse,N.Y.,del.	49.58	50.08	50.58	....
Chicago District				
Chicago I-3	46.00	46.50	46.50	47.00
Gary,Ind. C3	46.00	....	46.50	....
IndianaHarbor,Ind. I-2	46.00	....	46.50	....
So.Chicago,Ill. W14 Y1	46.00	46.50	46.50	....
So.Chicago,Ill. C3	46.00	....	46.50	47.00
Milwaukee, del.	47.89	48.39	48.39	48.89
Muskegon,Mich.,del.	....	51.98	51.98	....
Cleveland District				
Cleveland A7	46.00	46.50	46.50	47.00
Cleveland R2	46.00	46.50	46.50	....
Akron,del. from Cleve.	48.39	48.89	48.89	49.39
Lorain,O. N3	46.00	....	....	47.00
Duluth I-3	....	....	46.50	....
Erie,Pa. I-3	46.00	46.50	46.50	47.00
Everett,Mass. E1	....	50.50	51.00	....
Fontana,Calif. K1	52.00	52.50	....	....
Geneva,Utah G1	46.00	46.50	....	....
Seattle,Tacoma,Wash.,del.	....	54.20	....	....
Portland,Oreg.,del.	....	54.20	....	....
LosAngeles,SanFrancisco,del. ...	53.70	54.20	....	....
GraniteCity,Ill. M10	47.90	48.40	48.90	....
St.Louis,del. (incl. tax).....	48.65	49.15	49.65	....
Ironton, Utah C11	46.00	46.50	....	....
Minnequa,Colo. C10	47.00	47.50	47.50	....
Pittsburgh District				
NevilleIsland,Pa. P6	46.00	46.50	46.50	47.00
Pitts,N.&S. sides, Ambridge, Aliquippa,del.	47.19	47.69	47.69	48.19
McKeesRocks,del.	46.95	47.45	47.45	47.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	47.44	47.94	47.94	48.44
Verona,del.	47.90	48.40	48.40	48.90
Brackenridge,del.	48.13	48.63	48.63	49.13
Bessemer,Pa. C3	46.00	....	46.50	47.00
Clairton,Rankin,So.Duquesne,Pa. C3	46.00	....	....	....
McKeesport,Pa. N3	46.00	....	....	47.00
Sharpsville,Pa. S6	46.00	46.50	46.50	47.00
Steelton,Pa. B2	48.00	48.50	49.00	49.50
Steubenville, O. W10	46.00	....	....	....
Struthers,O. S16	46.00	....	....	....
Swedeland,Pa. A3	48.00	48.50	49.00	49.50
Philadelphia,del.	49.44	49.94	50.44	50.94
Toledo,O. I-3	46.00	46.50	46.50	47.00
Cincinnati,del.	51.01	51.51	....	....
Troy,N.Y., R2	48.00	48.50	49.00	49.50
Youngstown District				
Hubbard,O. Y1	46.00	46.50	46.50	....
Youngstown C3	46.00	....	....	47.00
Youngstown Y1	46.00	46.50	46.50	47.00
Mansfield,O. del.	50.26	50.76	50.76	51.26

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorous: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1 for each 0.5% Si to 11.50%)

Jackson,O. G2, J1	$57.00
Buffalo H1	56.25

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for 0.045% max. P)

NiagaraFalls,N.Y. P15	$71.50
Keokuk,Iowa, Openhearth & Fdry, frt. allowed K2	77.00
Keokuk, Iowa, OH & Fdry., 12½ lb. piglets, frt. allowed K2.	82.00
Wenatchee, Wash., OH & Fdry, frt. allowed K2	77.00

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged from silicon over base grade; also for hard chilling iron Nos. 5 x 6)

LylesTenn. T3	$60.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$51.00
Steelton,Pa. B2	54.00
Philadelphia delivered	57.00
Troy,N.Y. R2	54.00

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL, Apr. 13, 1950; cents per pound unless otherwise noted. Changes shown in italics.
Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Detroit R7 .....$50.00
Munhall,Pa. C3 .....50.00

INGOTS, Alloy (NT)
Detroit R7 .....$51.00
Houston,Tex. S5 .....59.00
Midland,Pa. C18 .....51.00
Munhall,Pa. C3 .....51.00
SoDuquesne,Pa. C3 ..51.00

BILLETS, BLOOMS & Slabs Carbon, Rerolling (NT)
Bessemer,Pa. C3 ....$53.00
Clairton,Pa. C3 .....53.00
Conshohocken,Pa. A3 .58.00
Ensley,Ala. T2 .....53.00
Fairfield,Ala. T2 .....53.00
Fontana,Cal. K1 .....72.00
Gary,Ind. C3 .....53.00
Johnstown,Pa. B2 ....53.00
Lackawanna,N.Y. B2..53.00
Munhall,Pa. C3 .....53.00
Sharon,Pa. S3 .....57.00
SoChicago,Ill. C3 ....53.00
So.Duquesne,Pa. C3 ..53.00

Carbon, Forging (NT)
Bessemer,Pa. C3 ....$63.00
Buffalo R2 .....63.00
Canton,O. R2 .....63.00
Clairton,Pa. C3 .....63.00
Cleveland R2 .....63.00
Conshohocken,Pa. A3..65.00
Detroit R7 .....63.00
Ensley,Ala. T2 .....63.00
Fairfield,Ala. T2 .....63.00
Fontana,Calif. K1 ....85.00
Gary,Ind. C3 .....63.00
Geneva, Utah G1 .....63.00
Houston,Tex. S5 .....71.00
Ind.Harbor,Ind. I-2 ...63.00
Johnstown,Pa. B2 ....63.00
Lackawanna,N.Y. B2 ..63.00
Los Angeles B3 .....82.00
Munhall,Pa. C3 .....63.00
Seattle B3 .....82.00
So.Chicago C3,R2,W14.63.00
So.Duquesne,Pa. C3 ...63.00
So.SanFrancisco B3 ...82.00
Warren,O. C17 .....63.00

Alloy (NT)
Bethlehem,Pa. B2 ....$66.00
Buffalo R2 .....66.00
Canton,O. R2, T7 ....66.00
Conshohocken,Pa. A3..68.00
Detroit R7 .....66.00
Fontana,Calif. K1 ....85.00
Gary,Ind. C3 .....66.00
Houston,Tex. S5 .....74.00
Ind.Harbor,Ind. Y1 ...66.00
Johnstown,Pa. B2 ....66.00
Lackawanna,N.Y. B2 ..66.00
LosAngeles B3 .....86.00
Massillon,O. R2 .....66.00
Midland,Pa. C18 .....66.00
Munhall,Pa. C3 .....66.00
Sharon,Pa. S3 .....66.00
So.Chicago C3,R2,W14.66.00
So.Duquesne,Pa. C3 ..66.00
Warren,O. C17 .....66.00
Youngstown Y1 .....66.00

SHEETS BARS (NT)
Mansfield,O. E6 .....$58.00
Sharon,Pa. S3 .....57.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 .....$76.00
Cleveland R2 .....76.00
Ind.Harbor, Ind. I-2 ...76.00
Massillon,O. R2 .....76.00
So.Chicago,Ill R2 ....76.00

SKELP
Aliquippa,Pa. J5 .....3.25
Munhall,Pa. C3 .....3.15
Warren,O R2 .....3.15
Youngstown C3, R2 ...3.15

WIRE RODS
AlabamaCity,Ala. R2 ..3.85
Buffalo W12 .....3.85
Cleveland A7 .....3.85
Donora,Pa. A7 .....3.85
Fairfield,Ala. T2 .....3.85
Houston Tex. S5 .....4.25
Ind.Harbor,Ind. Y1 ....3.85
Johnstown,Pa. B2 .....3.85
Joliet,Ill. A7 .....3.85
LosAngeles B3 .....4.65
Minnequa,Colo. C10 ...4.10
Monessen,Pa. P7 .....3.85
No.Tonawanda,N.Y. B11.4.10
Pittsburg,Calif. C11 ...4.50
Portsmouth,O. P12 ....3.85
Roebling,N.J. R5 .....3.95
So.Chicago,Ill. R2 .....3.85
SparrowsPoint B2 .....3.95
Sterling,Ill.(1) N15 ....3.85
Struthers,O. Y1 .....3.85
Torrance,Calif. C11 ....4.65

STRUCTURALS Carbon Steel Stand. Shapes
Aliquippa,Pa. J5 .....3.40
Bessemer,Ala. T2 .....3.40
Bethlehem,Pa. B2 .....3.45
Clairton,Pa. C3 .....3.40
Fairfield,Ala. T2 .....3.40
Fontana,Calif. K1 .....4.00
Gary,Ind. C3 .....3.40
Geneva,Utah G1 .....3.40
Houston, Tex. S5 .....3.80
Ind.Harbor,Ind. I-2 ...3.40
Johnstown,Pa. B2 .....3.45
KansasCity,Mo. S5 ....4.00
Lackawanna,N.Y. B2 ..3.45
Los Angeles B3 .....4.00
Minnequa,Colo. C10 ...3.75
Munhall,Pa. C3 .....3.40
Niles,Calif.(22) P1 ....4.02
Phoenixville,Pa. P4 ....3.30
Portland,Oreg. O4 .....3.90
Seattle B3 .....4.05
So.Chicago,Ill. C3, W14.3.40
So.SanFrancisco B3 ...3.95
Torrance,Calf. C11 ...4.00
Weirton,W.Va. W6 ....3.40

Alloy Stand. Shapes
Clairton,Pa. C3 .....4.05
Fontana,Calif. K1 .....5.25
Munhall,Pa. C3 .....4.05
So.Chicago,Ill. C3 .....4.05

H.-S. Low-Alloy Stand. Shapes
Aliquippa,Pa. J5 .....5.15
Bessemer,Ala. T2 .....5.15
Bethlehem,Pa.(14) B2..5.20
Clairton,Pa. C3 .....5.15
Fairfield,Ala. T2 .....5.15
Fontana,Calif. K1 .....5.75
Gary,Ind. C3 .....5.15
Ind.Harbor,Ind. I-2, Y1.5.15
Johnstown,Pa. B2 .....5.20
Lackawanna,N.Y.(14)B2 5.20
Munhall,Pa. C3 .....5.15
So.Chicago,Ill. C3 .....5.15
Struthers,O. Y1 .....5.15

Wide Flange
Bethlehem,Pa. B2 .....3.45
Lackawanna,N.Y. B2 ..3.45
Munhall,Pa. C3 .....3.40
So.Chicago,Ill. C3 .....3.40

H.-S., L-A Wide Flange
Munhall,Pa. C3 .....5.10
So.Chicago,Ill. C3 .....5.10

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ...4.20
Lackawanna,N.Y. B2 ..4.20
Munhall,Pa. C3 .....4.20
So.Chicago,Ill. C3 .....4.20
Weirton,W.Va. W6 ....4.20

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.50
Aliquippa,Pa. J5 .....3.50
Ashland,Ky.(15) A10 ..3.50
Bessemer,Ala. T2 .....3.50
Clairton,Pa. C3 .....3.50
Claymont,Del. W16 ....3.60
Cleveland J5, R2 .....3.50
Coatesville,Pa. L7 .....3.60
Conshohocken,Pa. A3 ..3.60
Ecorse,Mich. G5 .....3.75
Fairfield,Ala. T2 .....3.50
Fontana,Calif. K1 .....4.10
Gary,Ind. C3 .....3.50
Geneva,Utah G1 .....3.50
Harrisburg,Pa. C5 .....3.50
Houston,Tex. S5 .....3.90
Ind.Harbor,Ind. I-2, Y1.3.50
Johnstown,Pa. B2 .....3.50
Lackawanna,N.Y. B2 ..3.50
Minnequa,Colo. C10 .....4.30
Munhall,Pa. C3 .....3.50
Pittsburgh J5 .....3.50
Seattle B3 .....4.40
Sharon,Pa. S3 .....3.50
So.Chicago,Ill. C3, W14.3.50
SparrowsPoint,Md. B2..3.50
Steubenville,O. W10 ...3.50
Warren,O. R2 .....3.50
Weirton,W.Va. W6 ....3.50
Youngstown C3, R2, Y1.3.50

PLATES (Universal Mill)
Fontana,Calf. K1 ....4.40

PLATES, Carbon A.R.
Fontana,Calif. K1 .....5.25

PLATES, Open-Hearth Alloy
Coatesville,Pa. L7 .....4.50
Conshohocken,Pa. A3 ..4.40
Fontana,Calif. K1 .....5.40
Gary,Ind. C3 .....4.40
Johnstown, Pa. B2 .....4.40
Munhall,Pa. C3 .....4.40
Sharon,Pa. S3 .....4.40
So.Chicago,Ill. C3 .....4.40
SparrowsPoint,Md. B2..4.40

PLATES, Wrought Iron
Economy,Pa. B14 .....7.85

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.35
Bessemer,Ala. T2 .....5.35
Clairton,Pa. C3 .....5.35
Cleveland J5, R2 .....5.35
Conshohocken,Pa. A3 ..5.35
Ecorse,Mich. G5 .....5.60
Fairfield,Ala. T2 .....5.35
Fontana,Calif. K1 .....5.95
Gary,Ind. C3 .....5.35
Geneva,Utah G1 .....5.35
Houston,Tex. S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.35
Johnstown,Pa. B2 .....5.35
Munhall,Pa. C3 .....5.35
Pittsburgh J5 .....5.35
Sharon,Pa. S3 .....5.35
So.Chicago,Ill. C3 .....5.35
SporrowsPoint,Md. B2 ..5.35
Warren,O. R2 .....5.35
Youngstown Y1 .....5.35

FLOOR PLATES
Cleveland J5 .....4.55
Conshohocken,Pa. A3 ..4.55
Harrisburg,Pa. C5 .....4.55
Ind.Harbor,Ind. I-2 ....4.55
Munhall,Pa. C3 .....4.55
So.Chicago,Ill. C3 .....4.55

PLATES, Ingot Iron
Ashland,c.l. (15) A10 ..3.75
Ashland,lcl(15) A10 ..4.25
Cleveland,cl R2 .....4.10
Warren,O. cl R2 .....4.10

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.45
Aliquippa,Pa. J5 .....3.45
Alton,Ill.(1) L1 .....3.45
Ashland,Ky.(17) A10 ..3.45
Atlanta,Ga. A11 .....3.60
Bessemer,Ala. T2 .....3.45
Buffalo R2 .....3.45
Canton,O. R2 .....3.45
Clairton,Pa. C3 .....3.45
Cleveland R2 .....3.45
Ecorse,Mich. G5 .....3.65
Emeryville,Calif. J7 ...4.20
Fairfield,Ala. T2 .....3.45
Fontana,Calif, K1 .....4.10
Gary,Ind. G3 .....3.45
Houston,Tex. S5 .....3.85
Ind.Harbor,Ind. I-2, Y1..3.45
Johnstown,Pa. B2 .....3.45
KansasCity,Mo. S5 ....4.05
Lackawanna,N.Y. B2 ..3.45
Los Angeles B3 .....4.15
Marion,O. P11 .....3.35
Midland,Pa. C18 .....3.45
Milton,Pa. B6 .....3.45
Minnequa,Colo. C10 ...3.85
Niles,Calif. P1 .....4.17
N.Tonawanda,N.Y. B11.3.45
Pittsburg,Calif. C11 ...4.15
Pittsburgh J5 .....3.45
Portland,Oreg. O4 .....4.20
Seattle B3, N14 .....4.20
So.Chicago C3, R2, W14.3.45
So.Duquesne,Pa. C3 ...3.45
S.SanFran.,Cal. B3 ....4.20
Struthers,O. Y1 .....3.45
Torrance,Calif. C11 ...4.15
Weirton,W.Va. W6 ....3.45
Youngstown C3, R2 ....3.45

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....3.45
Atlanta A11 .....3.60
Johnstown,Pa. B2 .....3.45
Lackawanna,N.Y. B2 ..3.45
Niles,Calif. P1 .....4.17
Pittsburgh(23) J5 .....3.45
Portland,Oreg. O4 .....4.20
SanFrancisco S7 .....4.00
Weirton,W.Va. W6 ....3.45

BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 .....3.65

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 .....3.95
Buffalo R2 .....3.95
Canton,O. R2, T7 .....3.95
Clairton,Pa. C3 .....3.95
Ecorse,Mich. G5 .....4.25
Fontana,Calif. K1 .....4.95
Gary,Ind. C3 .....3.95
Houston,Tex. S5 .....4.35
Ind.Harbor,Ind. I-2, Y1.3.95
Johnstown,Pa. B2 .....3.95
KansasCity,Mo. S5 ....4.55
Lackawanna,N.Y. B2 ..3.95
Los Angeles B3 .....5.00
Massillon,O. R2 .....3.95
Midland,Pa. C18 .....3.95
So.Chicago C3, R2, W14.3.95
So.Duquesne,Pa. C3 ...3.95
Struthers,O. Y1 .....3.95
Warren,O. C17 .....3.95
Youngstown C3 .....3.95

BARS, Hot-Rolled Ingot Iron
Ashland,Ky.(17) A10 ..3.70

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.20
Bessemer,Ala. T2 .....5.20
Bethlehem,Pa. B2 .....5.20
Clairton,Pa. C3 .....5.20
Cleveland R2 .....5.20
Ecorse,Mich. G5 .....5.40
Fairfield,Ala. T2 .....5.20
Fontana,Calif. K1 ....6.25
Gary,Ind. C3 .....5.20
Ind.Harbor,Ind. I-2, Y1.5.20
Johnstown,Pa. B2 ....5.20
Lackawanna,N.Y. B2 ..5.20
Pittsburgh J5 .....5.20
So.Duquesne,Pa. C3 ...5.20
Struthers,O. Y1 .....5.20
Youngstown C3 .....5.20

BARS, Cold-Finished Carbon
Aliquippa,Pa. K5 .....4.15
Ambridge,Pa. W18 ....4.15
BeaverFalls,Pa. M12,R2.4.15
Buffalo B5 .....4.15
Camden,N.J. P13 .....4.63
Carnegie,Pa. C12 .....4.15
Chicago W18 .....4.15
Cleveland A7, C20 .....4.15
Detroit P17 .....4.30
Donora,Pa. A7 .....4.15
Ecorse,Mich. G5 .....4.35
Elyria,O. W8 .....4.15
FranklinPark,Ill. N5 ..4.15
Gary,Ind. R2 .....4.15
Hammond,Ind. L2, M13.4.15
Hartford,Conn. R2 ....4.55
Harvey,Ill. B5 .....4.15
LosAngeles R2 .....5.55
Mansfield,Mass. B5 ....4.55
Massillon,O. R2, R8 ...4.15
Midland,Pa. C18 .....4.15
Monaca,Pa. S17 .....4.15
Newark,N.J. W18 .....4.55
Plymouth,Mich. P5 ....4.40
Pittsburg J5 .....4.10
Putnam,Conn. W18 ....4.55
Readville,Mass. C14 ....4.55
St.Louis,Mo. M5 .....4.55
So.Chicago,Ill. W14 ....4.15
SpringCity,Pa.(5) K3 ..4.55
Struthers,O. Y1 .....4.15
Waukegan,Ill. A7 .....4.15
Youngstown F3, Y1 ....4.15

BARS, Cold-Finished Alloy
Aliquippa,Pa. K5 .....4.90
Ambridge,Pa. W18 ....4.90
BeaverFalls,Pa. M12 ..4.90
Bethlehem,Pa. B2 .....4.90
Buffalo B5 .....4.90
Canton,O. R2, T7 .....4.90
Carnegie,Pa. C12 .....4.90
Chicago W18 .....4.90
Cleveland A7, C20 .....4.90
Detroit P17 .....5.05
Donora,Pa. A7 .....4.90
Elyria,O. W8 .....4.90
Gary,Ind. R2 .....4.90
Hammond,Ind. L2, M13.4.90
Hartford,Conn. R2 ....5.20
Harvey,Ill. B5 .....4.90
Lackawanna,N.Y. B2 ..4.90
Mansfield,Mass. B5 ....5.20
Massillon,O. R2, R8 ...4.90
Midland,Pa. C18 .....4.90
Monaca,Pa. S17 .....4.90
Newark,N.J. W18 .....5.20
Plymouth,Mich. P5 .....5.10
So.Chicago,Ill. R2, W14.4.90
Struthers,O. Y1 .....4.90
Waukegan,Ill. A7 .....4.90
Warren,O. C17 .....4.90
Worcester,Mass. A7 ....5.20
Youngstown F3, Y1 .....4.90

RAIL STEEL BARS
ChicagoHts.,Ill.(3) I-2..3.30
ChicagoHts.,Ill.(4) I-2..3.45
FortWorth,Tex.(26) T4..4.33
Huntngtn,W.Va.(3) W7..3.45
Moline,Ill.(3) R2 .....3.40
SouthAvis,Pa.(2) J8 ....3.30
SouthAvis,Pa.(41) J8 ....3.30
SouthAvis,Pa.(42) J8 ....3.30
Williamsport(2,3) S19 ..3.45

BARS, Wrought Iron
Economy,Pa.(S.R.) B14.9.50
Economy,Pa.(D.R.)B14 11.00
Economy,(Staybolt)B14 11.30
Dover,N.J.(Staybolt)U1 15.00
Dover(Eng. Bolt) U1 ..13.50
Dover(Wrgt,Iron) U1 .12.25
McK.Rks.(S.R.) L5 ....8.60
McK.Rks.(D.R.) L5 ...11.25
McK.Rks.(Staybolt) L5.12.75

BARS, Reinforcing
(Fabricated; to Consumers)
Huntington,W.Va. W7 ..4.50
Johnstown, ¼-1" B2 ..4.35
Los Angeles B3 .....5.00
Marion,O. P11 .....4.25
Seattle B3, N14 .....5.10
SouthAvis,Pa. J8 .....4.35
So.SanFrancisco B3 ...5.00
SparrowsPt., ¼-1" B2 ..4.35
Williamsport,Pa. S19 ..4.35

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.45
Alton,Ill.(6) L1 .....3.45
Atlanta,Ga. A11 .....3.60
Buffalo R2 .....3.45
Cleveland R2 .....3.45
Emeryville,Calif. J7 ...4.20
Fairfield,Ala. T2 .....3.45
Fontana,Calif. K1 .....4.10
Gary,Ind. C3 .....3.45
Houston,Tex. S5 .....3.85
Ind.Harbor,Ind. I-2,Y1.3.45
Johnstown,Pa. B2 .....3.45
KansasCity,Mo. S5 ....4.05
Lackawanna,N.Y. B2 ..3.45
Los Angeles B3 .....4.15
Milton,Pa. B6 .....3.45
Minnequa,Colo, C10 ...4.25
Niles,Calif. P1 .....4.17
Pittsburg,Calif. C11 ....4.15
Pittsburgh J5 .....3.45
Portland,Oreg. O4 .....4.20
SandSprings,Okla. S5 ...4.35
Seattle,Wash. B3, N14..4.20
SouthAvis,Pa. J8 .....3.45
So.Chicago,Ill. R2 .....3.45
So.Duquesne,Pa. C3 .....3.45
So.SanFrancisco B3 ....4.20
SparrowsPoint,Md. B2 ..3.45
Struthers,O. Y1 .....3.45
Torrance,Calif. C11 ....4.15
Youngstown C3, R2 ....3.45

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. C3 .....4.20
Fontana,Calif. K1 .....4.95
Gary,Ind. C3 .....4.20
Youngstown C3 .....4.20

SHEETS, Hot-Rolled Steel (18 gage and heavier)
AlabamaCity,Ala. R2 ..3.35
Ashland,Ky.(8) A10 ...3.35
Butler,Pa. A10 .....3.35
Cleveland J5, R2 .....3.35
Conshohocken,Pa. A3 ..3.45
Ecorse,Mich.(8) G5 ....3.55
Fairfield,Ala. T2 .....3.35
Fontana,Calif. K1 .....4.25
Gary,Ind. C3 .....3.35
Ind.Harbor,Ind. I-2, Y1.3.35
Irvin,Pa. C3 .....3.35
Lackawanna,N.Y. B2 ..3.35
Munhall,Pa. C3 .....3.35
Niles,O. N12 .....3.50
Niles,O. M4 .....3.75
Pittsburg,Calif. C11 ...4.05
Pittsburgh J5 .....3.35
Sharon,Pa. S3 .....3.35
So.Chicago,Ill. W14 ....3.35
SparrowsPoint,Md. B2 ..3.35
Steubenville,O. W10 ...3.35
Torrance,Calif. C11 ....4.05
Warren,O. R2 .....3.35
Weirton,W.Va. W6 ....3.35
Youngstown C3, Y1 ....3.35

SHEETS, Hot-Rolled Carbon Steel (19 gage and lighter)
AlabamaCity,Ala. R2 ..4.50
Dover,O. R1 .....4.65
Ind.Harbor,Ind. I-2 ....4.40
Mansfield,O. E6 .....4.15
Niles,O. N12 .....4.10
Niles,O. M4 .....4.65
Torrance,Calif. C11 ....5.15

SHEETS, H-R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 .....5.05
Conshohocken,Pa. A3 ..5.05
Ecorse,Mich. G5 .....5.25
Fairfield,Ala. T2 .....5.05
Fontana,Calf. K1 .....6.74
Gary,Ind. C3 .....5.05
Ind.Harbor,Ind. I-2, Y1.5.05
Irvin,Pa. C3 .....5.05
Lackawanna(35) B2 ...5.05
Pittsburgh J5 .....5.05
Sharon,Pa. S3 .....5.05
So.Chicago,Ill. C2 .....5.05
SparrowsPoint(36) B2 ..5.05
Warren,O. R2 .....5.05
Weirton,W.Va. W6 ....5.05
Youngstown, C3, Y1 ...5.05

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 .....6.20
Ecorse,Mich. G5 .....6.40
Fontana,Calif. K1 .....7.05
Gary,Ind. C3 .....6.20
Ind.Harbor,Ind. I-2, Y1.6.20
Irvin,Pa. C3 .....6.20
Lackawanna(37) B2 ...6.20
Pittsburgh J5 .....6.20
Sharon,Pa. S3 .....6.20
SparrowsPoint(38) B2 ..6.20
Warren,O. R2 .....6.20
Weirton,W.Va. W6 ....6.20
Youngstown Y1 .....6.20

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10 .....4.10
Cleveland J5, R2 .....4.10
Ecorse,Mich. G5 .....4.30
Fairfield,Ala. T2 .....4.10
Follansbee,W.Va. F4 ..4.10
Fontana,Calif. K1 .....5.00
Gary,Ind. C3 .....4.10
GraniteCity,Ill. G4 .....4.30
Ind.Harbor,Ind. I-2, Y1.4.10
Irvin,Pa. C3 .....4.10
Lackawanna,N.Y. B2 ..4.10
Middletown,O. A10 .....4.10
Pittsburg,Calif. C11 ....5.05
Pittsburgh J5 .....4.10
SparrowsPoint,Md. B2..4.10
Steubenville,O. W10 ....4.10
Warren,O. R2 .....4.10
Weirton,W.Va. W6 ....4.10
Youngstown Y1 .....4.10

SHEETS, Gal'zd No. 10 Steel

AlabamaCity,Ala. R2 ..4.40
Ashland,Ky.(8) A10 ....4.40
Canton,O. R2 .....4.40
Delphos,O. N16 .....5.15
Dover,O. R1 .....4.75
Fairfield,Ala. T2 .....4.40
Gary,Ind. C3 .....4.40
GraniteCity,Ill. G4 .....4.60
Ind.Harbor,Ind. I-2 ....4.40
Irvin,Pa. C3 .....4.40
Kokomo,Ind. C16 .....4.50
MartinsFerry,O. W10 ..4.40
Niles,O. N12 .....4.65
Pittsburg,Calif. C11 ....5.15
SparrowsPoint,Md. B2 .4.40
Steubenville,O. W10 ....4.40
Torrance,Calif. C11 ....5.15
Weirton,W.Va. W6 ....4.40

SHEETS, Galvanized No. 10, High-Strength Low Alloy

Irvin,Pa. C3 .....6.75
SparrowsPoint(39) B2 ..6.75

SHEETS, Galvannealed Steel

Canton,O. R2 .....4.95
Irvin,Pa. C3 .....4.95
Kokomo,Ind. C16 .....5.05
Niles,O. N12 .....5.20

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10 .....4.65
Middletown,O. A10 ....4.65

SHEETS, Electro Galvanized

Cleveland R2 (28) 5.25
Niles,O. R2 (28) 5.25
Weirton,W.Va. W6 .....5.10

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2 ....5.05

SHEETS, Long Terne, Steel (Commercial Quality)

BeechBottom,W.Va. W10 4.80
Gary,Ind. C3 .....4.80
Mansfield,O. E6 .....4.80
Middletown,O. A10 ....4.80
Niles,O. N12 .....4.80
Weirton,W.Va. W6 ....4.80

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....5.20

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. C3 .....$17.50
Yorkville, O. W10 ....17.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2 .....$6.60
Gary,Ind. C3 .....6.50
Ind.Harbor I-2 .....6.50
Irvin,Pa. C3 .....6.50
Yorkville,O. W10 .....6.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville, O. W10.....$7.05

SHEETS, Mfg. Ternes, 8 lb

Gary,Ind. C3 .....$8.10
Warren,O. R2 .....8.10
Yorkville,O. W10 .....8.10

SHEETS, Coated Ternes, 12 lb

Yorkville,O. W10 .....8.95

SHEETS, Culvert, No. 16	Cu Alloy	Cu Fe
Ashland A10 ...	5.20	...
Canton,O. R2 ...	5.25	5.70
Fairfield,Ala. T2.	5.20	5.45
Gary C3	5.20	5.45
IndianaHarbor I-2	5.20	5.45
Irvin,Pa. C3	5.20	5.45
Kokomo C16	5.40	...
MartinsFy,O. W10	5.20	5.45
Pittsburg,Cal. C11	5.95	...
SparrowsPt. B2 .	5.20	...
Torrance,Cal. C11	5.95	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10 .....5.45

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland,Ky.(8) A10 ...3.60
Cleveland R2 .....3.95
Ind.Harbor,Ind. I-2 ....3.60
Warren,O. R2 .....3.95

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....4.70
Middletown,O. A10 ....4.60
Warren,O. R2 .....4.70

SHEETS, Galvanized Ingot Iron No. 10 Flat

Ashland,Ky (8) A10....4.65
Canton,O. R2 .....5.15
Ind.Harbor,Ind. I-2 ....4.80

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10 .....4.90
Middletown,O. A10 ....4.90

SHEETS, Well Casing

Torrance,Calif. C11 ....4.85

SHEETS, Drum Body

Pittsburg,Calif. C11 ....4.05
Torrance,Calif. C11 ....4.05

SHEETS, Aluminized

Butler,Pa. A10 .....7.75

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$6.35	$6.60	$6.85
Fairfield,Ala. T2	6.45	6.70	6.95
Gary,Ind. C3	6.35	6.60	6.85
GraniteCity,Ill. G4	6.55	6.80	7.05
Ind.Harbor,Ind. I-2, Y1	6.35	6.60	6.85
Irvin,Pa. C3	6.35	6.60	6.85
Niles,O. R2	6.35	6.60	6.85
Pittsburg,Calif. C11	7.10	7.35	7.60
SparrowsPoint,Md. B2	6.45	6.70	6.95
Weirton,W.Va. W6	6.35	6.60	6.85
Yorkville,O. W10	6.35	6.60	6.85

SHEETS, SILICON, H.R. or C.R. (22 Ga.) COILS (Cut Lengths ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	6.70	7.95	8.75
Brackenridge,Pa. A4	...	...	7.20	8.45	9.25
GraniteCity,Ill. G4(cut lengths)	...	...	6.90	8.15	...
Ind.Harbor,Ind. I-2	6.40	6.70	(34)	...	...
Mansfield,O. E6 (cut lengths).	5.90	6.20	6.70	7.95	8.75
Niles,O. N12 (cut lengths)	...	...	6.20	6.70	...
Niles,O. M4 (24 Gage)	...	5.65	5.95	6.45	...
Parkersburg F4 (cut lengths).	...	...	...	6.70	7.95
Vandergrift,Pa. C3	...	...	6.70	7.20	8.45
Warren,O. R2	...	6.40	6.70	7.20	8.45
Zanesville,O. A10	...	...	6.70	7.20	8.45

SHEETS, SILICON (22 Gage Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.30	9.85	10.55	11.35
Brackenridge,Pa. A4	9.80	10.35	11.05	....
Parkersburg F4 (cut lengths).	9.30	...	....	....
Vandergrift,Pa. C3	9.80	10.35	11.05	11.85
Warren,O. R2	9.80	....	....	....
Zanesville,O. A10	9.80	10.35	11.05	11.85

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Vandergrift,Pa. C3	12.35	13.20	14.20	14.70

TIN PLATE, American COKE (Base Box)	1.25 lb	1.50 lb
Aliquippa J5	$7.30	$7.50
Fairfield,Ala. T2.	7.40	7.60
Gary C3	7.30	7.50
Gran.City,Ill. G4.	7.50	7.70
Ind.Harbor I-1, Y1	7.30	7.50
Irvin,Pa. C3	7.30	7.50
Pitts.Cal. C11	8.05	8.25
Sp.Pt.,Md. B2	7.40	7.60
Warren R2	7.30	7.50
Weirton W6	7.30	7.50
Yorkville,O. W10.	7.30	7.50

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$5.60
Fairfield,Ala. T2 .....5.70
Gary,Ind. C3 .....5.60
GraniteCity,Ill. G4 .....5.80
Ind.Harbor,Ind. I-2, Y1.5.60
Irvin,Pa. C3 .....5.60
Niles,O. R2 .....5.60
Pittsburg,Calif. C11 ...6.35
SparrowsPoint,Md. B2 .5.70
Warren,O. R2 .....5.60
Weirton,W.Va. W6 ....5.60
Yorkville, O. W10 .....5.60

HOLLOWARE ENAMELING Black Plate (29 gage)

Aliquippa,Pa. J5 .....5.30
Follansbee,W.Va. F4 ..5.30
Gary,Ind. C3 .....5.30
GraniteCity,Ill. G4 .....5.50
Ind.Harbor,Ind. Y1 ....5.30
Irvin,Pa. C3 .....5.30
Niles,O. R2 .....5.30
SparrowsPoint,Md. B2..5.40
Warren,O. R2 .....5.30
Yorkville,O. W10 .....5.30

SHEETS, Enam'lg. Iron

Ashland,Ky.(8) A10 ...4.40
Cleveland R2 .....4.40
Ecorse,Mich. G5 .....4.70
Gary,Ind. C3 .....4.40
GraniteCity,Ill. G4 .....4.60
Ind.Harbor,Ind. I-2 ....4.40
Irvin,Pa. C3 .....4.40
Middletown,O. A10 ....4.40
Niles,O. M4 .....4.90
Youngstown Y1 .....4.40

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2 .....4.95
Conshohocken,Pa. A3 ..4.95
Ecorse,Mich. G5 .....5.15
Fairfield,Ala. T2 .....4.95
Fontana,Cal. K1 .....6.64
Gary,Ind. C3 .....4.95
Ind.Harb.,Ind. I-2, Y1..4.95
Lackawanna,N.Y. B2 ..4.95
Sharon,Pa. S3 .....4.95
SparrowsPoint,Md. B2..4.95
Warren,O. R2 .....4.95
Weirton,W.Va. W6 ....4.95
Youngstown C3, Y1 ...4.95

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15.5.10
Carnegie,Pa. S18 .....5.10
Fontana,Calif. K1 .....6.30
Gary,Ind. C3 .....5.10
Houston,Tex. S5 .....5.50
KansasCity,Mo. S5 ....5.70
NewBritn.Conn.(10) S15.5.10
Sharon, Pa.S3 .....5.10
Youngstown C3 .....5.10

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...3.50
Warren,O. R2 .....3.85

STRIP, Hot-Rolled Carbon

Alton,Ill.(1) L1 .....3.25
Ashland,Ky.(8) A10 ...3.25
Atlanta A11 .....3.40
Bessemer,Ala. T2 .....3.25
Bridgeprt,Conn.(10) S15.3.25
Butler,Pa. A10 .....3.25
Carnegie,Pa. S18 .....3.25
Conshohocken,Pa. A3 ..3.35
Detroit M1 .....3.45
Ecorse,Mich. G5 .....3.45
Fairfield,Ala. T2 .....3.25
Fontana,Calif. K1 .....4.40
Gary,Ind. C3 .....3.25
Houston,Tex. S5 .....3.65
Ind.Harbor,Ind. I-2, Y1.3.25
KansasCity,Mo.(9) S5 ..3.85
Lackawanna,N.Y. B2 ..3.25
LosAngeles B3 .....4.00
Milton,Pa. B6 .....3.25
Minnequa,Colo. C10 ....4.30
NewBritain(10) S15 ...3.25
N.Tonawanda,N.Y. B11.3.25
Pittsburg,Calif. C11 ....4.00
Riverdale,Ill. A1 .....3.25
SanFrancisco S7 .....3.90
Seattle B3, N14 .....4.25
Sharon,Pa. S3 .....3.25
So.Chicago,Ill. W14 ....3.25
So.SanFrancisco B3 ...4.00
SparrowsPoint,Md. B2 ..3.25
Torrance,Calif. C11 ....4.00
Warren,O. R2 .....3.25
Weirton,W.Va. W6 ....3.25
WestLeechburg,Pa. A4..3.25
Youngstown C3, Y1 ....3.25

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15.9.50
Carnegie,Pa. S18 .....9.50
Cleveland A7 .....9.50
Dover,O. G6 .....9.50
Harrison,N.J. C18 .....9.80
NewBritn.Conn.(10) S15.9.50
Pawtucket,R.I.(11) NS..9.50
Pawtucket,R.I.(12) NS..9.80
Sharon,Pa. S3 .....9.50
Worcester,Mass. A7 ...9.80
Youngstown C8 .....9.50

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....4.75

STRIP, Cold-Finished, Spring Steel (Annealed)	0.25-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Bridgeport,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
Bristol,Conn. W1	...	...	6.40	8.35	....
Carnegie,Pa. S18	...	5.95	6.55	8.50	10.80
Cleveland A7	4.15	5.95	6.55	8.50	10.80
Dover,O. G6	4.15	5.95	6.55	8.50	10.80
FranklinPark,Ill. T6	4.40	6.10	6.70	8.65	....
Harrison,N.J. C18	...	...	6.85	8.80	11.10
Mattapan,Mass. T6	4.65	6.25	6.85	8.80	11.10
NewBritn.,Conn.(10) S15	4.15	5.95	6.55	8.50	10.80
NewCastle,Pa. B4	4.15	5.95	6.55	8.50	....
NewCastle,Pa. E5	4.15	5.95	6.55	8.50	10.80
NewYork W3	...	6.30	6.90	8.85	11.15
Pawtucket, R. I. NS:					
Cleve.orPitts.Base (29)4.70		*5.95*	*6.55*	*8.50*	*10.80*
Worcester,Base (29)4.65		*6.25*	*6.85*	*8.80*	*11.10*
Sharon,Pa. S3	4.15	5.95	6.55	8.50	10.80
Trenton,N.J. R5	...	...	6.25	6.85	8.80	11.10
Wallingford,Conn. W2	4.65	6.25	6.85	8.80	11.10
Weirton,W.Va. W6	4.15	5.95	6.55	8.50	10.80
Worcester,Mass. A7	4.45	6.25	6.85	8.80	11.10
Worcester,Mass. T6	4.65	6.25	6.85	8.80	11.10
Youngstown C8	4.50	5.95	6.55	8.50	10.80
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	9.30	11.25	13.85
Harrison,N.J. C18	...	...	9.30	11.25	13.85

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6 ..4.15
Berea,O. C7 .....6.60
Bridgprt,Conn.(10) S15.4.15
Butler,Pa. A10 .....4.15
Cleveland A7, J5 .....4.15
Dearborn,Mich. D3 ....4.40
Detroit, D2 .....4.40
Detroit M1 .....4.35
Dover,O.(40) G6 .....4.15
Ecorse,Mich. G5 .....4.35
Follansbee,W.Va. F4 ...4.15
Fontana,Calif. K1 .....5.40
FranklinPark,Ill. T6 ..4.30
Ind.Harbor,Ind. I-2 ....4.30
Lackawanna,N.Y. B2 ...4.15
LosAngeles C1 .....5.50
Mattapan,Mass.(21) T6.4.65
Middletown,O. A10 ....4.15
NewBritain(10) S15 ....4.15
NewCastle,Pa. B4, E5..4.15
NewHaven,Conn. A7, D2.4.65
NewYork W3 .....5.00
Pawtucket,R.I.(21) NS..4.65
Riverdale,Ill. A1 .....4.30
Rome,N.Y. R6 .....4.15
Sharon,Pa.(30) S3 .....4.15
SparrowsPoint,Md. B2 ..4.15
Trenton,N.J.(13) R5 ...4.65
Wallingford,Conn. W2 ..4.65
Warren,O.(25) T5 .....4.15
Warren,O. R2 .....4.15
Weirton,W.Va. W6 ....4.15
Youngstown C8, Y1 ....4.15

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5.....6.20
Dover,O. G6 .....6.20
Ecorse,Mich. G5 .....6.40
Fontana,Calif. K1 .....6.95
Lackawanna,N.Y., B2 ..6.40
Sharon,Pa. S3 .....6.20
SparrowsPoint,Md. B2..6.40
Warren,O. R2 .....6.20
Weirton,W. Va. W6.....6.20
Youngstown Y1 .....6.20

STRIP, Electro Galvanized

Weirton,W.Va. W6 ....4.15
Youngstown C8 .....4.15

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C3 Carnegie-Illinois Steel
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cld.Roll.Mills Co.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Son, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F6 Fretz-Moon Tube Co.

G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K5 Kidd Drawn Steel Co.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

TIGHT COOPERAGE HOOP

Atlanta A11	3.60
Riverdale,Ill. A1	3.60
Sharon,Pa. S3	3.60
Youngstown C3	3.60

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	5.90
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Fostoria,O. S1	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Milbury,Mass(12) N6	6.20
Monessen,Pa. P7, P16	5.90
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Struthers,O. Y1	5.90
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester A7,J4,T6,W12	6.20

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	5.35
Buffalo W12	5.35
Cleveland A7	5.35
Crawfordsville,Ind. M8	5.35
Dover,O. G6	5.35
Fostoria,O. S1	5.50
Kokomo,Ind. C16	5.35
FranklinPark,Ill. T6	5.70
Massillon,O. R8	5.35
Monessen,Pa. P7, P16	5.35
Pawtucket,R.I.(12) N8	5.65
Trenton,N.J. R5	5.65
Worcester A7, T6, W12	5.65

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.45
Buffalo W12	8.45
Chicago W13	8.45
Cleveland A7	8.45
Crawfordsville,Ind. M8	8.45
Fostoria,O. S1	8.45
Johnstown,Pa. B2	8.45
Kokomo,Ind. C16	8.45
Monessen,Pa. P16	8.45
Palmer,Mass. W12	8.75
Portsmouth,O. P12	8.45
Roebling,N.J. R5	8.75
Waukegan,Ill. A7	8.45
Worcester,Mass. A7, T6	8.75

WIRE, Manufacturers Bright, Low-Carbon

AlabamaCity,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Atlanta A11	4.60
Alton,Ill.(1) L1	4.50
Bartonville,Ill.(1) K4	4.50
Buffalo W12	4.50
Chicago W13	4.50
Cleveland A7, C20	4.50
Crawfordsville,Ind. M8	4.60
Donora,Pa. A7	4.50
Duluth A7	4.50
Fairfield,Ala. T2	4.50
Fostoria,O.(24) S1	4.85
Houston S5	4.90
Johnstown,Pa. B2	4.50
Joliet,Ill. A7	4.50
KansasCity,Mo. S5	5.10
Kokomo,Ind. C16	4.60
LosAngeles B3	5.45
Minnequa,Colo. C10	4.75
Monessen,Pa. P7	4.50
Newark,6-8ga. I-1	5.15
No.Tonawanda B11	4.90
Palmer,Mass. W12	4.80
Pittsburg,Calif. C11	5.45
Portsmouth,O. P12	4.50
Rankin,Pa. A7	4.50
So.Chicago,Ill. R2	4.50
So.SanFrancisco C10	5.45
SparrowsPoint,Md. B2	4.60
Sterling,Ill.(1) N15	4.50
Struthers,O. Y1	4.50
Torrance,Calif. C11	5.45
Waukegan,Ill. A7	4.50
Worcester,Mass. A7, T6	4.80

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.55
Alton,Ill.(1) L1	5.55
Buffalo W12	5.55
Cleveland A7	5.55
Donora,Pa. A7	5.55
Duluth A7	5.55
Johnstown,Pa. B2	5.55
LosAngeles B3	6.50
Monessen,Pa. P7, P16	5.55
NewHaven,Conn. A7	5.85
Palmer,Mass. W12	5.85
Pittsburg,Calif. C11	6.50
Portsmouth,O. P12	5.55
Roebling,N.J. R5	5.85
So.Chicago,Ill. R2	5.55
SparrowsPoint,Md. B2	5.65
Struthers,O. Y1	5.55
Torrance,Calif. C11	6.50
Trenton,N.J. A7	5.85
Waukegan,Ill. A7	5.55
Worcester,Mass. A7	5.85

ROPE WIRE	Mild Plow	Plow	Imp. Plow
Bartonville,Ill. K4	8.05	8.05	8.30
Buffalo W12	8.05	8.05	8.30
Cleveland A7	8.05	8.05	8.30
Donora,Pa. A7	8.05	8.05	8.30
Fostoria,O. S1	8.05	8.05	8.30
Johnstown,Pa. B2	8.05	8.05	8.30
Monessen,Pa. P7, P16	8.05	8.05	8.30
NewHaven,Conn. A7	8.35	8.35	8.60
Palmer,Mass. W12	8.05	8.05	8.30
Portsmouth,O. P12	8.05	8.05	8.30
Roebling,N.J. R5	8.35	8.35	8.60
SparrowsPoint,Md. B2	8.15	8.15	8.40
Struthers,O. Y1	8.05	8.05	8.30
Trenton,N.J. A7	8.35	8.35	8.60
Waukegan,Ill. A7	8.05	8.05	8.30
Williamsport,Pa. B2	8.15	8.15	8.40
Worcester,Mass. J4, T6	8.35	8.35	8.60

WIRE Merchant Quality (6 to 8 gage)

	An'ld	Galv.
AlabamaCity R2	5.35	5.60
Aliquippa J5	5.35	5.60
Atlanta A11	5.45	5.70
Bartonville(19) K4	5.35	5.60
Buffalo(31) W12	4.50	...
Cleveland A7	5.35	5.60
Crawfordsvil. M8	5.45	5.70
Donora A7	5.35	5.60
Duluth A7	5.35	5.60
Fairfield T2	5.35	5.60
Houston,Tex. S5	5.75	6.00
Johnstown B2	5.35	5.60
Joliet,Ill. A7	5.35	5.60
KansasCy,Mo. S5	5.95	6.20
Kokomo C16	5.45	5.70
LosAngeles B3	6.30	...
Minnequa C10	5.60	5.85
Monessen P7	5.35	5.60
Palmer(31) W12	4.80	...
Pitts.,Cal. C11	6.30	6.55
Prtsmth.(18) P12	5.35	5.60
Rankin A7	5.35	5.60
So.Chicago R2	5.35	5.60
So.S.Fran. C10	6.30	6.55
SparrowsPt. B2	5.45	5.70
Sterling,Ill.(1)N15	5.35	5.60
Struthers,O. Y1	5.35	5.60
Torrance,Cal. C11	6.30	...
Worcester A7	5.65	5.90

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Aliquippa J5	9.80	11.30
Bartonville(1) K4	9.80	11.30
Cleveland A7	9.80	11.30
Crawfrdvil. M8	9.80	11.30
Fostoria,O. S1	9.90	11.40
Johnstown B2	9.80	11.30
Kokomo C16	9.80	11.30
Minnequa C10	9.40	10.90
Palmer,Mass. W12	9.35	10.85
Pitts.,Cal. C11	10.15	11.65
Prtsmth.(18) P12	9.80	11.30
SparrowsPt. B2	9.90	11.40
Waukegan A7	9.80	11.30

WIRE, Galv'd ACSR for Cores

Monessen,Pa. P16	8.15
Roebling,N.J. R5	8.45
SparrowsPoint,Md. B2	8.25

WIRE, Tire Bead

Monessen,Pa. P16	10.80
Roebling,N.J. R5	10.80

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	126
Aliquippa,Pa. J5	126
Atlanta A11	128
Crawfordsville M8	128
Donora,Pa. A7	126
Duluth,Minn. A7	126
Fairfield,Ala. T2	126
Houston,Tex. S5	134
Johnstown,Pa. B2	126
Joliet,Ill. A7	126
KansasCity,Mo. S5	138
Kokomo,Ind. C16	128
Minnequa,Colo. C10	131
Monessen,Pa. P7	126
Pittsburg,Calif. C11	146
Portsmouth,O.(18) P12	126
Rankin,Pa. A7	126
So.Chicago,Ill. R2	126
So.SanFran.,Calif. C10	146
SparrowsPoint,Md. B2	128
Sterling,Ill.(1) N15	126

FENCE POSTS

	Col.
Duluth A7	116
Huntington,W.Va. W7	116
Johnstown,Pa. B2	116
Joliet,Ill. A7	116
Minnequa,Colo. C10	121
Moline,Ill. R2	112
So.Chicago R2	116
Williamsport,Pa. S19	120

WOVEN FENCE, 9-15½Ga. Col.

AlabamaCity,Ala. R2	116
Ala.City,Ala.,17-18ga.R2	198
Aliquippa,Pa.9-14½ga.J5	116
Atlanta A11	118
Bartonville,Ill.(19) K4	116
Crawfordsville,Ind. M8	118
Donora,Pa. A7	116
Duluth A7	116
Houston,Tex. S5	124
Fairfield,Ala. T2	116
Johnstown,Pa. B2	116
Johnstn,17ga.6" B2	190
Johnstn,17ga.,4" B2	193
Joliet,Ill. A7	116
KansasCity,Mo. S5	128
Kokomo,Ind. C16	118
Minnequa,Colo. C10	121
Monessen,Pa. P7	116
Pittsburg,Calif. C11	139
Portsmouth,O.(18) P12	116
Rankin,Pa. A7	116
So.Chicago,Ill. R2	116

BALE TIES, Single Loop Col.

AlabamaCity,Ala. R2	113
Atlanta A11	114
Bartonville,Ill.(19) K4	113
Chicago W13	113
Crawfordsville M8	115
Donora,Pa. A7	113
Duluth A7	113
Fairfield,Ala. T2	113
Joliet,Ill. A7	113
KansasCity,Mo. S5	125
Kokomo,Ind. C16	115
Minnequa,Colo. C10	118
Pittsburg,Calif. C11	137
Portsmouth,O.(18) P12	113
So.Chicago,Ill. R2	113
So.SanFran.,Calif. C10	137
SparrowsPoint,Md. B2	115
Sterling,Ill.(1) N15	113

NAILS & STAPLES, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	106
Aliquippa,Pa. J5	106
Atlanta A11	108
Bartonville,Ill.(19) K4	106
Chicago,Ill. W13	106
Cleveland A9	112
Crawfordsville,Ind. M8	108
Donora,Pa. A7	106
Duluth A7	106
Fairfield,Ala. T2	106
Galveston,Tex. D7	114
Houston,Tex. S5	114
Johnstown,Pa. B2	106
Joliet,Ill. A7	106
KansasCity,Mo. S5	118
Kokomo,Ind. C16	108
Minnequa,Colo. C10	111
Monessen,Pa. P7	106
Pittsburg,Calif. C11	125
Portsmouth,O. P12	106
Rankin,Pa. A7	106
So.Chicago,Ill. R2	106
SparrowsPoint,Md. B2	108

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. C3	3.40	3.30	3.35	3.75
Ensley,Ala. T2	3.40	3.30	...	3.75
Fairfield,Ala. T2	...	...	...	3.75
Gary,Ind. C3	3.40	3.30	3.35	...
Huntington,W.Va. W7	...	...	...	3.75
Ind.Harbor,Ind. I-2	3.40	3.30	3.35	...
Johnstown,Pa. B2	...	...	...(16)	3.75
Lackawanna B2	3.40	3.30	...	3.75
Minnequa,Colo. C10	3.40	3.30	...	4.25
Steelton,Pa. B2	3.40	3.30	...	...

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	5.35
Bartonville,Ill.(19) K4	5.35
Crawfordsville,Ind. M8	5.45
Donora,Pa. A7	5.35
Duluth A7	5.35
Johnstown,Pa. B2	5.35
Joliet,Ill. A7	5.35
Kokomo,Ind. C16	5.45
Minnequa,Colo. C10	5.60
Pittsburg,Calif. C11	6.30
Portsmouth,O. P12	5.35
Rankin,Pa. A7	5.35
So.Chicago,Ill. R2	5.35
SparrowsPoint,Md. B2	5.45
Worcester,Mass. A7	5.65

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3	$6.75
Wheeling,W.Va. W10	6.75

AXLES

Fairfield,Ala. T2	5.25
Gary,Ind. C3	5.25
Ind.Harbor,Ind. S13	5.25
Johnstown,Pa. B2	5.25
McKeesRocks,Pa. C3	5.25

TIE PLATES

Fairfield,Ala. T2	4.20
Gary,Ind. C3	4.20
Ind.Harbor,Ind. I-2	4.20
Lackawanna,N.Y. B2	4.20
Minnequa,Colo. C10	4.20
Pittsburg,Calif. C11	4.35
Pittsburgh R2	4.20
Seattle B3	4.35
Steelton,Pa. B2	4.20
Torrance,Calif. C11	4.35
Weirton,W.Va. W6	4.20

JOINT BARS

Bessemer,Pa. C3	4.40
Fairfield,Ala. T2	4.40
Ind.Harbor,Ind. I-2	4.40
Joliet,Ill. C3	4.40
Lackawanna,N.Y. B2	4.40
Minnequa,Colo. C10	4.40
Steelton,Pa. B2	4.40

TRACK BOLTS (20) Treated

Fairfield,Ala. T2	9.10
KansasCity,Mo. S5	9.10
Lebanon,Pa.(32) B2	8.85
Minnequa,Colo. C10	8.85
Pittsburgh 03, P14	9.10
Seattle B3	9.35

STANDARD TRACK SPIKES

Fairfield,Ala. T2	5.60
Ind.Harbor,Ind. I-2, Y1	5.60
KansasCity,Mo. S5	5.85
Lebanon,Pa. B2	5.60
Minnequa,Colo. C10	5.60
Pittsburgh J5	5.60
Seattle B3	6.10
So.Chicago,Ill. R2	5.60
Struthers,O. Y1	5.60
Youngstown R2	5.60

Key to Producing Companies

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M10 Missouri-Illinois Furnace
M12 Mo'trup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 New Eng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron&Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Steel Div. Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 Reliance Div.,EatonMfg.
S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel

V2 Vanadium Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 Wstrn.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.
Y1 Youngstwn Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	21.00	18W,4Cr,3V	126.00
Extra Carbon	24.50	18W,4Cr,2V,9Co	185.50
Spec. Carbon	29.50	18W,4Cr,2V,6Co	169.50
Oil Hardening	32.00	18.25W,4.25Cr,1V,4.75Co	156.50
Cr Hot Wrk.	32.00	20.25W,4.25Cr,1.6V,12.25Co	293.50
Hi-Carbon-Cr	57.50	1.5W,4Cr,1V,8.5Mo	71.50
18W,4Cr,1V	100.00	6.4W,4.5Cr,1.9V,5Mo.	76.50
18W,4Cr,2V	113.00	6W,4Cr,3V,6Mo	97.00

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M9, M14, R2, S8, T7, U4, V2, V3.

(1) Chicago Base. (2) Angles. (3) Merchant. (4) Reinforcing. (5) Philadelphia del. (6) Chicago or Birm. Base. (7) To jobbers, 3 cols. lower. (8) 16 gage and heavier. (9) 6 in. and narrower. (10) Pittsburgh Base. (11) Cleveland & Pittsburgh Base. (12) Worcester, Mass. Base. (13) 3" & wider; over ½" to under 3" 5.15c. (14) Also wide flange beams. (15) ¼" and thinner. (16) 40 lb and under. (17) Flats only. (18) To dealers. (19) Chicago & Pittsburgh Base. (20) Deduct 0.25c for untreated. (21) New Haven, Conn. Base. (22) Del. San Fran. Bay area. (23) Angles 1"x1" to 1¼"x1¼" only. (24) Deduct 0.35c for finer than 15 Ga. (25) Up to 0.035 C; 4.40c, 0.035 C and over. (26) Reinforcing, mill shipments; to consumers, 4.85c; fabricated to fabricators, 4.58c. (28) Bonderized. (29) 0.26-0.40 C. (30) 0.40 C and less. (31) Not annealed. (32) Untreated. (33) To jobbers, deduct 20 cents. (34) 6.70c for cut lengths. (35) 72" and narrower. (36) 54" and narrower. (37) 15 Ga. & lighter; 60" & narrower. (38) 14 Ga. & lighter; 48" & narrower. (39) 48" and narrower. (40) Lighter than 0.035"; 4.40c, 0.035" and heavier. (41) Flats. (42) Bands.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.5c	0.24	36.5	34.5	35.5	8.5	9	7.5
¼	6.0	0.42	33.5	31.5	32.5	9.5	11	8.5
⅜	6.0	0.57	29	27.	28	5.5	8	4.5
½	8.5	0.85	40.5	38.5	39.5	24.0	22.0	23.0
¾	11.5	1.13	43.5	41.5	42.5	28.0	26.0	27.0
1	17.00	1.68	46.0	44.0	45.0	31.0	29.0	30.0
1¼	23.0	2.28	46.5	44.5	45.5	31.5	29.5	30.5
1½	27.5	2.73	47.0	45.0	46.0	32.0	30	31.0
2	37.0	3.68	47.5	45.5	46.5	32.5	30.5	31.5
2½	58.5	5.82	48.0	46.0	47.0	33.0	31.0	32.0
3	76.5	7.62	48.0	46.0	47.0	33.0	31.0	32.0

Column A: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 1½ percentage points lower on ⅛", 2 points lower on ¼", 3 points lower on ⅜", W10. Wheatland, Pa., 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain, O. N3; Youngstown, plus 42% on 3½" and 4", R2; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 31% on 3½" and 4".

Columns B & E: Sparrows Point Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y-1; Alton, Ill. (Lorain, O., base) L1 quotes 2 points lower on ½", ¼", ⅜".

Column D: Etna, Pa. N2; Monaca, Pa. P9; Sharon, Pa. M6; Butler, Pa., ⅛" through ⅜", F6; Benwood, W. Va., except 3½ points lower on ⅛", 2½ pts on ¼", 3 pts on ⅜", W10. Wheatland, Pa., except 2 pts lower on ⅛" through ⅜", W9. Following make ½" and larger: Lorain N3; Youngstown, plus 26.5% on 3½" and 4", R2; Youngstown, Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11 points lower on ½" and larger continuous weld and 15.5% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	36.0	20.5	36.0	20.5
2½	58.5	5.82	39.0	23.5	39.0	23.5
3	76.5	7.62	39.0	23.5	39.0	23.5
3½	92.0	9.20	41.0	25.5	41.0	25.5
4	$1.09	10.89	41.0	25.5	41.0	25.5
5	1.48	14.81	41.0	25.5	41.0	25.5
6	1.92	19.18	41.0	25.5	41.0	25.5

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5; Lorain, O. N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	12.36	14.39	13.96	13.96
1¼	13	14.63	17.05	14.19	16.54
1½	13	16.17	19.02	15.68	18.45
1¾	13	18.39	21.64	17.84	20.99
2	13	20.61	24.24	19.99	23.51
2¼	13	22.96	27.03	22.27	26.22
2½	12	25.29	29.76	24.53	28.87
2½	12	27.71	32.58	26.88	31.60
2¾	12	29.36	34.53	28.48	33.49
3	12	30.82	36.27	29.90	35.18
3¼	11	35.87	42.22	34.79	40.95
3½	11	38.52	45.35	37.36	43.99
4	10	47.82	56.25	46.39	54.56
4½	9	63.37	74.59	61.47	72.35
5	9	73.37	86.32	71.17	83.73
6	7	112.62	132.51	....	....

Boiler tube producers include Babcock & Wilcox Tube Co., National Tube Co., Globe Steel Tubes Co., Pittsburgh Steel Co., Republic Steel Corp., Standard Tube Co.

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates Carbon Base 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base 10% Both sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Copper Base Both Sides
302 ...	....	....	....	19.75	21.50–22.50	75.00
304 ...	22.50	26.50	....	20.75	22.50–24.00	77.00
305 ...	....	....	....	....	....	79.00
309 ...	27.00	31.00	....	....	....	....
310 ...	32.50	36.50	....	....	....	105.00
316 ...	27.00	31.00	....	26.00	28.00–32.00	....
317 ...	30.50	34.50	....	....	....	....
318 ...	29.50	33.50	....	....	....	....
321 ...	23.50	27.50	....	23.00	25.00	90.00
347 ...	25.00	29.00	....	24.00	26.00–30.00	94.00
405 ...	18.75	24.75	....	....	....	....
410 ...	18.25	24.25	....	....	....	....
430 ...	18.25	24.25	....	....	....	....
Nickel.	27.50	34.50	31.50 41.00	....	....	88.00
Inconel.	36.00	46.00	....	....	....	115.00
Monel .	29.00	37.00	26.50 33.50	....	....	83.00
Copper*	....	....	19.75† 23.75†	....	....	....

* Dexodized. † Deduct 4.25c for hot-rolled. Production points for carbon base products; Stainless plates and sheets, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16 and Coatesville, Pa. L7; nickel, inconel and monel-clad plates, Coatesville L7; nickel, monel and copper-clad strip, Carnegie, Pa. S18. Production point for copper-base sheets is Carnegie A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 27
- ⅝-in. & ⅝-in. 29
- ¾-in. and larger 26

Longer than 6 in.:
- All diams. 22

Lag bolts, all diams.:
- 6 in. and shorter 30
- over 6 in. long 28

Ribbed Necked Carriage. 26
Blank 40
Plow 40
Step, Elevator, Tap, and Sleigh Shoe 28
Tire bolts 20
Boiler & Fitting-Up Bolts 37

NUTS

H.P. & C.P. Reg. & Heavy Square:	Reg.	Heavy
½-in. and smaller ...	25	
⅝-in. & ⅝-in.	23	
¾-in.-1½-in.	23	
1⅝ in. and larger	16	
H.P. Hex.:	Reg.	Heavy
½-in. & smaller	33	29
⅝-in. & ⅝-in..	28	25
¾-in.-1½-in. ..	25	23
1⅝ in. & larger	17	16
C.P. Hex:		
½-in. & smaller	33	29
⅝-in. & ⅝-in..	30	27
¾-in. & 1½ in.	27	24
1⅝ in. & larger	20	17

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or key quantities)

	Hvy.	Reg.	Lght.
½-in. and smaller ...	35	41	41
⅝-in. & ⅝-in.	30	36	36
¾-in.-1½ in..	27	31	33
1⅝-in.&larger	17	21	..

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish ..... 63.5 & 10
Plated finishes ... 50 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ¼-in. through ⅝-in... 50
- ⅝-in. through 1 in... 43

Longer than 6 in.:
- ¼-in. through ⅝-in... 33
- ⅝-in. through 1 in... 13

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam x 6 in. and shorter 46
1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 41
¼-in. diam. & larger ... 24
N.F. thread, all diams. . 18

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.25c
7/16-in., under .....43 off

Washers, Wrought

F.o.b. shipping point, to jobbers .....Net to $1 off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Inches Diam.	Length	Cents per lb
17,18,20	60,72	16.00
8 to 16	48,60,72	16.50
7	48,60	17.75
6	48,60	19.00
4, 5½	40	19.50
3	40	20.50
2½	24,30	21.00
2	24,30	23.00

CARBON

40	100,110	7.50
35	100,110	7.50
30	84,110	7.50
24	72 to 104	7.50
17 to 20	34,90	7.50
14	60,72	8.00
10,12	60	8.25

STAINLESS STEEL

(cents per pound)

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	37.50	30.50	28.50
302...	37.50	33.00	28.50
303...	39.50	36.50	31.00
304...	39.50	35.00	30.00
309...	52.00	52.00	41.50
316...	53.00	55.00	46.00
321...	45.50	44.50	34.00
347...	50.00	48.50	38.50
410...	33.00	27.00	23.00
416...	33.50	33.50	23.50
420...	40.50	43.50	28.50
430...	35.50	27.50	23.50
501...	24.00	22.50	11.50
502...	25.00	23.50	12.50

Baltimore, Types 301 through 347 sheets, except 309 E2.
Baltimore, bars, wire and structurals A10.
Brackenridge, Pa., sheets A4
Bridgeville, Pa., bars, wire, sheets & strip, except Type 309 strip quoted 51.00c U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.
Carnegie, Pa., strip except Type 416; Type 309 strip quoted 51.00c S18.
Cleveland, strip, except Type 309 quoted 51.00c and except Type 416 A7.
Detroit, strip, except Type 309 M1.
Dunkirk, N.Y. bars, wire A4.
Duquesne, Pa., bars C3.
Gary, Ind., sheets except Type 416 C3.
Harrison, N. J., strip C18.
Massillon, all products, except Type 309 bars, wire & structurals quoted 42.00c. Type 501, 10.50c, Type 502 11.50c R2.
McKeesport, Pa., bars; sheets except Type 416, C3.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip, except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars C3.
Pittsburgh, sheets C18.
Reading, Pa., bars & strip except Type 309 bars quoted 41.00c C4.
So. Chicago, Ind., bars & structurals C3.
Syracuse, N. Y., bars wire & structurals C18.
Titusville, Pa., bars U4.
Wallingford, Conn., strip, except 309, W2 quotes ¼-cent higher.
Washington, Pa., bars sheets & strip except Type 309 strip quoted 51.00c J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 58.00c, strip 60.00c W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7
West Leechburg, Pa., strip, except Type 300 quoted 51.00c A4.
Youngstown, strip C8.

COAL, CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 22.00
Toluol, one deg..19.00-24.75
Industrial xylol..20.50-26.50

Per ton bulk, ovens

Sulphate of ammonia..$45.00

Cents per pound, ovens

Phenol, 40 (carlots, returnable drums) 13.50
Do., less than carlots.14.25
Do., tank cars 12.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $37; less than 60%, $34.
Imported, net ton, duty paid, metallurgical grade, $39-$40.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh)

	Cents
Sponge Iron:	
98+% Fe, carlots..	15.00
Swedish, c.i.f. New York, in bags..	7.40-8.50
Electrolytic Iron:	
Annealed, 99.5% Fe	39.50
Unannealed, 99+% Fe	33.50
Unannealed, 99+% Fe (minus 325 mesh)	48.50
Carbonyl Iron:	
97.9-99.8%, size 5 to 10 microns..	70.00-135.00
Aluminum:	
Carlots, freight allowed	27.00
Atomized, 500 lb drums, freight allowed	30.00
Brass, 10-ton lots.	23.25-26.25
Copper:	
Electrolytic	27.75
Reduced	27.00
Lead	18.50
Manganese:	
Minus 100-mesh	52.00-55.00
Minus 35 mesh	48.00
Minus 200 mesh....	56.00
Nickel, unannealed	61.00-66.00
Silicon	34.00-40.00
Solder (plus cost of metal)	8.50
Stainless Steel, 302...	75.00
Tin	86.50
Zinc, 10-ton lots..	15.25-18.00
	Dollars
Tungsten:	
99%, minus 80 to 200 mesh, freight allowed, over 1000 lb	2.90
1000 lb	2.95
less than 1000 lb..	3.00
98.8%, minus 65 mesh, freight allowed. 1000 lb and over..	2.90
less than 1000 lb..	3.00
Molybdenum:	
99%, minus 80 to 200 mesh. over 500 lb.....	2.25
200 to 500 lb	2.60
less than 200 lb...	2.75
82-88%, freight allowed. 2000 lb and over..	2.40
less than 2000 lb..	2.45
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll.fur. .$14.00-14.50
Connellsvll.fdry. .15.50-16.50
New River, foundry ..19.00
Wise county, foundry ..15.95
Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens .$22.00
Everett, Mass., ovens w England, del.† 23.40
Chicago, ovens 21.00
Chicago, del. .....†22.45
Detroit, del. 24.91
Terre Haute, ovens....21.20
Milwaukee, ovens 21.75
Indianapolis, ovens 20.75
Chicago, del. 24.12
Cincinnati, del. 23.67
Detroit, del. 24.65
Ironton, O., ovens 20.40
Cincinnati, del. 22.71
Painsville, O., ovens...21.90
Buffalo, del. 24.02
Cleveland, del. 23.62
Erie, del. 22.04
Birmingham, ovens 19.15
Philadelphia, ovens 21.25
Neville Island, Pa., ovens 21.00
Swedeland, Pa., ovens 21.20
Portsmouth, O., ovens.19.50
Detroit, ovens 21.65
Detroit, del. 22.65
Buffalo, del. 24.00
Flint, del. 24.09
Pontiac, del. 23.04
Saginaw, del. 24.40

Includes representative switching charge of: *, $1.05; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	5.75	6.84	7.20	6.04	...	5.85	6.64	8.60	5.65	5.90	7.34
New York(c'try)	5.55	6.64	7.00	5.84	...	5.65	6.44	8.40	5.45	5.70	7.14
Boston (city) ..	5.93	6.68	7.19	5.98	...	5.80	6.50	8.70	5.75	6.06	7.28
Boston (c'try) .	5.73	6.48	6.99	5.78	...	5.60	6.30	8.50	5.55	5.88	7.08
Phila. (city) ..	6.45	6.60	6.95	5.90	...	5.75	6.46	8.40	5.50	5.70	6.80
Phila. (c'try)..	6.20	6.35	6.70	5.65	...	5.50	6.21	8.15	5.25	5.45	6.55
Balt. (city) ...	5.25	6.69	6.66	5.79	...	5.69	6.39	...	5.69	5.40	7.04
Balt. (c'try) ..	5.05	6.49	6.46	5.59	...	5.49	6.19	...	5.49	5.20	6.84
Norfolk, Va. ..	6.10	...	...	...	...	6.15	7.20	...	6.20	6.15	7.55
Wash. (w'hse).	5.46	...	...	6.00	...	5.90	6.62	...	5.90	5.61	7.25
Buffalo (del.)..	5.25	6.00	7.00	5.61	...	5.25	5.95	10.10††[3]	5.35	5.65	6.95
Buffalo (w'hse)	5.05	5.80	6.80	5.41	...	5.05	5.75	9.90††[3]	5.15	5.45	6.75
Pitts. (w'hse)..	5.05	5.80*	6.45-6.70	5.20	6.15	5.00	5.75	9.55††	5.05	5.15	6.40
Detroit (w'hse).	5.33	6.08*	7.09	5.49	...	5.39	6.03	9.86††[3]	5.44	5.59	6.68
Cleveland (del.)	5.25	6.00	7.15	5.44	6.35	5.32	5.95	8.31	5.37	5.52	6.72
Cleve. (w'hse).	5.05	5.80	6.95	5.24	6.15	5.12	5.75	8.16	5.17	5.32	6.52
Cincin. (w'hse).	5.32	5.84	6.29	5.49	...	5.39	6.10	9.90††[3]	5.44	5.59	6.75
Chicago (city) .	5.25	6.00*	6.90	5.30	...	5.20	5.85	9.75††[3]	5.25	5.40	6.60
Chicago (w'hse)	5.05	5.80*	6.70	5.10	...	5.00	5.65	9.55††[3]	5.05	5.20	6.40
Milwaukee(city)	5.39	6.14*	7.04	5.44	...	5.34	6.09	9.89††[3]	5.39	5.54	6.74
Milwau. (c'try).	5.19	5.94*	6.84	5.24	...	5.14	5.89	9.69††[3]	5.19	5.34	6.54
St. Louis (del.).	5.78	6.28	7.18	5.58	...	5.48	6.28	10.03††[3]	5.53	5.68	6.88
St. L. (w'hse).	5.58	6.13	7.03	5.43	...	5.33	6.08	9.88††[3]	5.38	5.53	6.73
Birm'ham (del.)	5.20[10]	5.95	6.30[3]	5.25[10]	...	5.15[10]	6.88	...	5.20[10]	5.35[10]	7.63[10]
Birm'hm(w'hse)	5.05[10]	5.80	6.15[3]	5.10[10]	...	5.00[10]	...	...	5.05[10]	5.20[10]	...
Omaha, Nebr. .	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Los Ang. (city)	6.00	7.20	7.65	6.05	8.30	6.00	7.75	...	5.90	6.00	8.20
L. A. (w'hse).	5.80	7.00	7.45	5.85	8.10	5.80	7.55	...	5.70	5.80	8.00
San Francisco .	6.25[9]	8.60[3]	7.50[3]	6.75[9]	8.25[3]	6.15[9]	7.80[3]	...	6.00[9]	6.15[9]	8.10[9]
Seattle-Tacoma.	6.70†‡	8.15[3]	...	6.90	...	6.35	8.50	10.10	6.20	6.35[7]	8.40[7]
Kans. (w'hse) .	5.65	6.40	7.30	5.70	...	5.60	6.35	10.10	5.65	5.80	7.00

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [1]—1500 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [4]—400 to 1499 lb; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—300 to 999 lb; [8]—300 to 499 lb; [9]—400 to 3999 lb; [10]—500 to 9999 lb inclusive.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

***Super Duty*:** St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., Ottawa, Ill., $106. Hard-fired, $142 at above points.

***High-Heat Duty*:** Salina, Pa. $91; Woodbridge N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., Ottawa, Ill., $86.

***Intermediate-Heat Duty*:** St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky., Athens, or Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $80.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., Bessemer, Ala., $72; Ottawa, Ill., $70.

LADLE BRICK

***Dry Press*:** Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., Chester, W. Va., New Cumberland, W. Va., $60.

***Wire Cut*:** Chester, W. Va., Wellsville, O., New Cumberland, W. Va., $58.

MALLEABLE BUNG BRICK

St. Louis, Mo., Olive Hill, Ky., $96; Ottawa, Ill., $90; Beach Creek, Pa., $86.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $86; Hays, Pa., $91; Joliet or Rockdale, Ill., E. Chicago, Ind., $95; Lehi, Utah, Los Angeles, $101.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $84.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $85.

BASIC BRICK

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Burned chrome brick, $66; chemical-bonded chrome brick, $69; magnesite brick, $91; chemical-bonded magnesite, $80.

MAGNESITE

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ⅜" grains; bulk, $33; single paper bags, $38.

DOLOMITE

(Base prices per net ton)

Domestic, dead-burned bulk; Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After Jan. 25, 1950, increases or decreases, if any, in upper lake rail freight, dock handling charges and taxes thereon are for buyer's account.

Old range bessemer	$8.10
Old range nonbessemer	7.95
Mesabi bessemer	7.85
Mesabi nonbessemer	7.70
High phosphorus	7.70

EASTERN LOCAL ORE

Cents per unit, del E. Pa.

Foundry and basic 56.62% concentrates contract	16.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hemitites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Wolframite, scheelite, net ton unit, duty paid	$20-$22

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$17.00-18.00
48% no ratio	$17.30-18.30
48% no ratio	26.00
50% no ratio	27.00-27.50

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	25.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $65, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $172 per gross ton of alloy, cl., packed, $184; gross ton lots, packed, $199; less gross ton lots, packed, $216; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price: $174, f.o.b. Birmingham and Johnstown, Pa., furnaces; $172, Sheridan, Pa.; $175, Etna, Pa. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $214; less gross ton lots, $231 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 35.5c; ton lot 31.25c, less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.95c per lb of alloy, carload packed, 9.70c, ton lot 10.60c, less ton 11.60c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk, 20.5c per lb of contained Cr. c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered: Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

(*Please turn to page 137*)

Says Zinc Outlook Is Excellent

Howard I. Young, president, American Zinc, Lead & Smelting Co., points to high consumption rate in most industries. Supply of zinc concentrates is industry's major problem

St. Louis—Taking all factors into consideration, outlook for the zinc industry in 1950 is exceedingly good, as far as consumption and demand are concerned. That is the view held by Howard I. Young, president, American Zinc, Lead & Smelting Co., who spoke at the annual meeting of the American Zinc Institute here last week.

Supply of zinc materials in hands of consumers is equivalent to about 30 days' requirements. Industries cited as operating at a high level are the galvanizing, brass, and rubber tire, the latter using large tonnages of zinc pigments.

Demand for zinc in the automotive and other industries, where a large tonnage of die cast material is used, probably will be at a lower level during the last half of the year than at present, Mr. Young said.

Use of zinc in pigments will be normal in 1950. Paint manufacturing has not gotten under full swing and use of pigments is substantially below that expected. With the large volume of construction, it is reasonable to expect the paint industry to be at a better level during last half year than it probably will operate during first half.

Zinc Ore Supply—Mr. Young believes the major problem confronting the zinc industry in 1950 will be a sufficient supply of zinc concentrates during last half year to maintain smelting production of all presently operating plants at or near capacity.

He pointed out that the greater part of the government-owned concentrates will have been converted by end of third quarter and that production of zinc in the Rocky Mountain and western states undoubtedly will be reduced substantially during the last half of the year.

"It is my belief," he said, "assuming a continuation of the present price of zinc and lead throughout the remainder of the year, that total recoverable zinc produced in the United States during 1950 will not exceed 550,000 tons and probably will be nearer 525,000 tons."

The domestic concentrate picture indicates we must import around 750,000 tons of foreign zinc concentrates, which we have thus far never done. Ore imports in January and February contained about 40,000 tons of zinc, indicating that imports during last half must be substantially increased.

"Those ores coming from Canada will, no doubt, flow in at a normal rate," he said. "In Mexico we are presently faced with labor strikes and poor railway facilities, both of which will have a tendency to retard delivery of the normal tonnage that would come from Mexican mines. Recent announcements by the major producing company in Mexico indicates a reduction in lead production, which move will also reduce the zinc output."

Other factors tending to reduce the supply of zinc concentrates are high mining costs, change in economic conditions brought about by world currency adjustment and increased foreign smelting capacity, unfavorable tax and free trade government policies which retard new mine development in the United States.

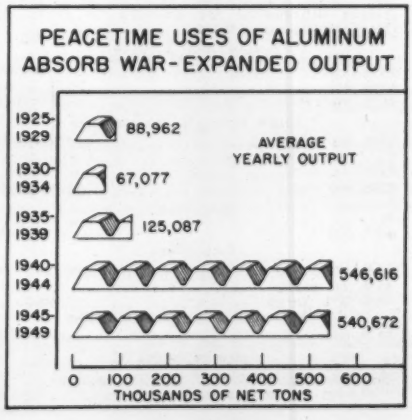
Producers' Stocks Drop—Assuming sufficient concentrates are available, it is estimated production of all grades of primary zinc during 1950 will total 911,000 tons. With production averaging about 78,000 tons monthly and shipments averaging 82,992 tons, "we will have reduced the total stock of zinc in the hands of the producers to the dangerously low level of around 40,000 tons, equivalent to approximately 15 days' domestic consumption by July 1, 1950.

"The requirements beginning July 1 may be substantially reduced but this will depend entirely on the policy of those charged with the responsibility of stockpiling critical materials. If the policy that is being pursued during second quarter of the year is continued, the available supply will be further reduced by that amount. The present domestic production is approximately in balance with domestic consumption."

R. L. Wilcox, chief of the nonferrous metals branch of the Economic Cooperation Administration, gave a statistical analysis of the world position which indicates a moderate excess of slab zinc but an inadequate supply of concentrates to meet smelters' requirements. He also points to the necessity of increasing U.S. mine production if current smelter operations are to be upheld.

Mining Retrenchment Forecast—Although the long-term outlook of the mining industry is good because of increasing population and per capita use of metals, the current factors of saturated domestic markets, declining foreign demand and the completion of stockpiling all point to a period of retrenchment in mining soon. This was the forecast of James Boyd, director of the United States Bureau of Mines. He pointed out also that the "door is virtually closed" on price support and production subsidies.

The convention re-elected all members of board of directors whose terms expired this year. The directors re-elected officers.



High Grade Zinc Demand Rises

Outlook in the wrought brass industry indicates increasing demand for high grade zinc in relation to brass special or other lower grades, and a probable slight decrease in total zinc used in relation to copper.

The total requirements for zinc, however, will no doubt continue to be large and tend to follow, as in the past, general industrial conditions.

This was the conclusion drawn by J. R. Freeman Jr., technical manager, American Brass Co., Waterbury, Conn., in his address at the annual meeting of the Zinc Institute.

Zinc Stocks Continue to Drop

New York—Zinc supplies continue to drop. Stocks of slab zinc held by domestic smelters declined 7643 tons in March to a total of 59,776 tons, the lowest level recorded since April, 1949. Zinc shipments in March were the largest in more than a year, rising 1332 tons to 85,589 tons, reports the American Zinc Institute. Unfilled orders at the end of last month were 55,533 tons, a gain of 10,402 tons since Feb. 28. Production increased to 74,700 tons in March from 72,700 tons in February and compared with 51,381 tons in March, 1949.

March production and stocks at the end of that month were in tons, respectively: Special high grade, 22,557 and 7399; high grade, 17,755 and 18,023; intermediate, 824 and 1029; prime western (including select and brass special), 36,785 and 33,325.

Demand for zinc by all principal users, including die casters and galvanizers, continues heavy. Many consumers are seeking additional tonnages for April delivery but these generally are unavailable. Prices are unchanged.

Aluminum Product Sales Rise

Washington—Average daily shipments of aluminum wrought products increased 22 per cent in February over the January total, but were about equal to those in February, 1949, reports Bureau of the Census. Shipments of magnesium wrought products in February were 12 per cent lower than in January, but 20 per cent higher than in February, 1949. Total shipments of aluminum products came to 111,293,000 pounds in February compared with 100,727,000 in January, and 110,034,000 pounds in February, 1949. Magnesium product shipments totaled 761,000 pound in February, 952,000 pounds in January, and 636,000 pounds in February, 1949.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 18.50c, Conn. Valley; Lake, **18.62½c, Conn. Valley.**

Brass Ingot: 85-5-5-5 (No. 115) 17.25-18.25c; 88-10-2 (No. 215) 25.25c; 80-10-10 (No. 305) 21.75c; No. 1 yellow (No. 405) 14.75-16.00c.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, East St. Louis; high grade 11.60c, delivered.

Lead: Common, 10.30c; chemical, 10.40c; corroding, 10.40c, St. Louis.

Primary Aluminum: 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point.

Secondary Aluminum: Piston alloys 16.00-16.50c; No. 12 foundry alloy (No. 2 grade) 15.50-16.00c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 17.25-17.75c; grade 2, 16.75-17.25c; grade 3, 15.25-15.75c; grade 4, 14.75-15.00c. Prices include freight at carload rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over, 20.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt del., 76.00c; April del. 75.87½c; May del. 75.62½c; June del. 75.50c.

Antimony: American 99-99.8% and over but not meeting specifications below 24.50c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 25.00c; f.o.b. Laredo, Tex., for bulk shipments. Foreign, 99%: Chinese, English, Belgian, prompt, 23.00c, New York.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

Mercury: Open market, spot, New York $71-$74 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $24.50 per lb contained Be.

Cadmium: "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.15.

Cobalt: 97-99%, $1.80 per lb for 550 lb (keg); $1.80 per lb for 100 lb (case); $1.87 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York, 71.75c per oz.

Platinum: $66-$69 per ounce.

Palladium: $24 per troy ounce.

Iridium: $100 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill; based on 18.50-cent copper.)

Sheet: Copper 32.18; yellow brass 28.69; commercial bronze, 95%, 32.10; 90%, 31.61; red brass, 85%, 30.60; 80%, 30.12; best quality, 29.58; nickel silver, 18%, 42.27; phosphor-bronze, grade A, 5% 50.90.

Rods: Copper, hot-rolled 28.03; cold-drawn 29.28; yellow brass free cutting, 23.19; commercial bronze, 95% 31.79; 90% 31.30; red brass 85% 30.29; 80% 29.81.

Seamless Tubing: Copper 32.22; yellow brass 31.70; commercial bronze 90% 34.27; red brass 85% 33.51; 80% 33.03.

Wire: Yellow brass 28.98; commercial bronze, 95% 32.39; 90% 31.90; red brass, 85% 30.89; 80% 30.41; best quality brass 29.87.

Copper Wire: Bare soft, f.o.b., eastern mills, 100,000 lb lots 22.55c, l.c.l. 23.17, c.l. 22.67; weatherproof, f.o.b. eastern mills, 100,000 lb lots 24.85, l.c.l. 25.60, c.l. 25.10; magnet, delivered, c.l. 28.50, 15,000 lb or more 28.75, l.c.l. 29.25.

ALUMINUM

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	26.9	...	...
0.135-0.096	12-48	27.4	...	...
0.095-0.077	12-48	27.9	26.0	29.6
0.076-0.068	12-48	28.5	26.2	29.8
0.067-0.061	12-48	28.5	26.2	29.8
0.060-0.048	12-48	28.7	26.4	30.1
0.047-0.038	12-48	29.1	26.6	30.4
0.037-0.030	12-48	29.5	27.0	30.9
0.029-0.024	12-48	29.9	27.3	31.3
0.023-0.019	12-36	30.5	27.7	31.8
0.018-0.017	12-36	31.1	28.3	32.6
0.016-0.015	12-36	31.8	28.9	33.5
0.014	12-24	32.7	29.7	34.6
0.013-0.012	12-24	33.6	30.4	35.5
0.011	12-24	34.6	31.3	36.7
0.010-0.0095	12-24	35.6	32.3	38.0
0.009-0.0085	12-24	36.8	33.4	39.5
0.008-0.0075	12-24	38.1	34.6	41.1
0.007	12-18	39.5	35.9	42.9
0.006	12-18	41.0	37.2	47.0

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	——Hexagonal—— R317-T4	17S-T4
0.125	48.0	...	...
0.156-0.203	41.0	...	...
0.219-0.313	38.0	...	...
0.344	37.0	...	47.0
0.375	36.5	45.5	44.0
0.406	36.5	...	...
0.438	36.5	45.5	44.0
0.469	36.5	...	...
0.500	36.5	45.5	44.0
0.531	36.5	...	...
0.563	36.5	...	41.5
0.594	36.5	...	...
0.625	36.5	43.0	41.5
0.656	36.5	...	...
0.688	36.5	...	41.5
0.750-1.000	35.5	40.5	39.0
1.063	35.5	...	37.5
1.125-1.500	34.5	39.0	37.5
1.563	34.5	..	36.5
1.625	33.5	...	36.5
1.688-2.000	33.5	...	...
2.125-2.500	32.5	...	...
2.625-3.375	31.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $15.50 per cwt; add 50c per cwt, 10 sq ft to 140 sq ft. Pipe: Full coils, $15.50 per cwt. Traps and bends: List price plus 37%.

ZINC

Sheets, 16.00c f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 15.50c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 14.50c; over 12-in., 15.50c.

NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled, 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb, 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb, 35.00-36.00c.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 25.50c; 5 tons and over 26.00c; 1 to 5 tons, 26.50c; less than 1 ton, 27.00c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 28.84c; oval 28.34c; cast 26.87c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 46.50c f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 18.00c; 1000 to 19,000 lb, 17.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 250 lb, 25.75c; over 250 lb, 24.75c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb, 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 100 lb, 64.00c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 26.50c; 400-lb bbl. 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over 91.00c; 500 to 999 lb, 91.5c; 200 to 499 lb, 92.00c; less than 200 lb, 93.5c; ball, 1000 lb and over, 93.25c; 500 to 999 lb, 93.75c; 200 to 499 lb 94.25c; less than 200 lb, 95.75c f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers 58.2c; 100 or 300 lb drums only, 100 to 500 lb, 49.9c; 600 to 1900 lb, 47.6c; 2000 to 9900 lb, 45.8c, f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100-lb drums 38.00c, f.o.b. Niagara Falls, N. Y.; 40.50c f.o.b. Cleveland; 39.25c, del., Detroit and Philadelphia.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb 84.50c; more than 2000 lb, 82.50c, f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, 70.80c; 100 lb kegs 71.80c, f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	15.50	15.50	14.75
Yellow Brass	12.50	12.25	11.37½
Commercial Bronze			
95%	14.50	14.25	13.75
90%	14.25	14.00	13.50
Red brass			
85%	14.00	13.75	13.25
80%	13.62½	13.37½	12.87½
Best Quality (71-80%)	13.37½	13.12½	12.62½
Muntz Metal	11.50	11.25	10.75
Nickel, silver, 10%	14.50	14.25	7.25
Phos. bronze, A	16.75	16.50	15.50
Naval brass	12.00	11.75	11.25
Manganese bronze	12.00	11.75	11.12½

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; composition red brass 12.50; radiators 10.00; heavy yellow brass 9.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 15.25; No. 2 copper 14.25; light copper 13.25; refinery brass (60% copper) per dry copper content 13.50-13.75.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 13.50-13.75; No. 2 12.50-12.75; light copper 11.50-11.75; No. 1 composition red brass 11.00-11.25; No. 1 composition turnings 10.25-10.50; mixed brass turnings 6.25-6.50; new brass clippings 10.50-11.00; No. 1 brass rod turnings 9.25-9.50; light brass 6.00-6.25; heavy yellow brass 7.25-7.50; new brass rod ends 9.75-10.00; auto radiators, unsweated 8.50-8.75; cocks and faucets, 8.50-8.75; brass pipe 9.00-9.25.

Lead: Heavy 8.00-8.25; battery plates 4.00-4.25; linotype and stereotype 8.75-9.00; **electrotype 8.25-8.50; mixed babbitt 8.00-8.25.**

Zinc: Old zinc 5.00-5.25; new die cast scrap 5.00-5.25; old die cast scrap 3.50-3.75.

Tin: No. 1 pewter 39.00-41.00; block tin pipe 60.00-62.00; No. 1 babbitt 30.00-32.00.

Aluminum: Clippings 2S 10.00-10.50; old sheets 7.00-7.50; crankcase 7.00-7.50; borings and turnings 4.00.

DAILY PRICE RECORD

1950	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Apr. 6-13	18.50	10.30	10.50	76.00	17.00	24.50	40.00	71.75
Apr. 5	18.50	10.30	10.50	75.375	17.00	24.50	40.00	71.75
Apr. 3-4	18.50	10.30	10.50	74.75	17.00	24.50	40.00	71.75
Apr. 1	18.50	10.30	10.25	74.75	17.00	24.50	40.00	71.75
Mar. Avg.	18.50	10.763	9.444	75.745	17.000	24.60	40.00	73.120
Mar. 31	18.50	10.30	10.25	74.75	17.00	24.50	40.00	71.75
Mar. 30	18.50	10.30	10.25	75.25	17.00	24.50	40.00	71.75
Mar. 29	18.50	10.30	10.25	76.00	17.00	24.50	40.00	72.75
Mar. 28	18.50	10.30	10.25	76.50	17.00	24.50	40.00	73.25
Mar. 27	18.50	10.30	10.25	77.12½	17.00	24.50	40.00	73.25
Mar. 23-25	18.50	10.30	10.00	77.75	17.00	24.50	40.00	73.25
Mar. 22	18.50	10.30	10.00	77.50	17.00	24.50	40.00	73.25
Mar. 21	18.50	10.30	10.00	77.12½	17.00	24.50	40.00	73.25

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumer prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Apr. 13, 1950; gross tons except as noted. Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Apr. 13	$29.08
Apr. 6	28.83
Mar. 1950	28.23
Apr. 1949	24.06
Apr. 1945	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$32.00-32.50
No. 2 Heavy Melt.	29.00
No. 1 Busheling	32.00-32.50
No. 1 Bundles	32.00-32.50
No. 2 Bundles	24.50-25.50
No. 3 Bundles	23.00-24.00*
Heavy Turnings	27.50-28.00
Machine Shop Turnings	22.50-23.00†
Mixed Borings, Turnings	22.50-23.00†
Short Shovel Turnings	26.00
Cast Iron Borings	25.00-26.00
Low Phos. Steel	35.00-36.00

Cast Iron Grades*

No. 1 Cupola Cast	34.50-35.50
No. 1 Machinery Cast	38.00-39.00
Charging Box Cast	31.00-32.00
Heavy Breakable Cast	29.00-30.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	*34.50-35.00*
Axles	*36.50-37.00*
Rails, Random Lengths	*37.00-38.00**
Rails, 2 ft. and under	39.00-40.00
Rails, 18 in. and under	40.00-41.00
Railroad Specialties	*37.00-37.50*
Angles, Splice Bars	37.00-38.00*

* Nominal.
† Crushers' buying prices.

CLEVELAND

No. 1 Heavy Melt. Steel	$29.00-29.50
No. 2 Heavy Melt. Steel	27.00-27.50
No. 1 Busheling	29.00-29.50
No. 1 Bundles	29.00-29.50
No. 2 Bundles	*23.50-24.00*
Machine Shop Turnings	*19.50-20.00*
Mixed Borings, Turnings	*22.50-23.00*
Short Shovel Turnings	*22.50-23.00*
Cast Iron Borings	*22.50-23.00*
Low Phos.	30.00-30.50

Cast Iron Grades

No. 1 Cupola	*43.00-44.00*
Charging Box Cast	38.00-39.00
Stove Plate	35.50-36.50
Heavy Breakable Cast	*32.50-33.00*
Unstripped Motor Blocks	31.00-32.00
Brake Shoes	28.50-29.50
Clean Auto Cast	*43.50-44.50*
No. 1 Wheels	36.50-37.00
Burnt Cast	33.00-33.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50-33.00
R.R. Malleable	38.50-39.00
Rails, 3 ft and under	41.00-42.00
Rails, 18 in. and under	43.00-44.00
Rails, Random Lengths	38.00-39.00
Cast Steel	34.00-35.00
Railroad Specialties	35.00-35.50
Uncut Tires	36.00-37.00
Angles, Splice Bars	41.00-41.50

VALLEY

No. 1 Heavy Melt. Steel	$32.50-33.00
No. 2 Heavy Melt. Steel	30.00-31.00
No. 1 Bundles	32.50-33.00
No. 2 Bundles	25.50-26.50
Machine Shop Turnings	22.00-23.00
Short Shovel Turnings	24.50-25.00
Cast Iron Borings	24.50-25.00
Low Phos.	33.50-34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00-33.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	*$26.00*
No. 2 Heavy Melt. Steel	*24.00*
No. 1 Busheling	*25.00*
No. 1 Bundles	*26.00*
No. 2 Bundles	*20.50*
Machine Shop Turnings	18.00
Short Shovel Turnings	*20.50-21.00*
Mixed Borings, Turnings	17.00
Low Phos. Punchings and Plate, elec. fur. grade	30.00
Low Phos. Plate, 5 ft & under	29.00
Elec. Furnace Bundles	26.50
Heavy Turnings	*27.00-28.00*
No. 1 Chemical Borings	30.00
Knuckles and couplers	31.00-32.00
Steel car wheels	*31.00-32.00*

Cast Iron Grades

No. 1 Cupola Cast	*33.00-34.00*
No. 1 Machinery Cast	38.00
No. 1 Yard Cast	*32.00-33.00*
Charging Box Cast	*36.00*
Heavy Breakable Cast	*36.00*
Unstripped Motor Blocks	25.00
Clean Auto Cast	38.00
No. 1 Wheels	*40.00*
Malleable	39.00-40.00

CINCINNATI

No. 1 Heavy Melt. Steel	$28.00
No. 2 Heavy Melt. Steel	23.00
No. 1 Busheling	28.00
No. 1 Bundles	28.00
No. 2 Black Bundles	23.00
No. 3 Bundles	18.00
Machine Shop Turnings	15.00
Short Shovel Turnings	18.00
Mixed Borings, Turnings	17.00
Cast Iron Borings	18.00

Cast Iron Grades

No. 1 Cupola Cast	40.00
Charging Box Cast	36.00
Stove Plate	29.00
Heavy Breakable Cast	33.00
Unstripped Motor Blocks	24.00
Brake Shoes	23.00
Clean Auto Cast	40.00
Drop Broken Cast	43.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	31.00
R.R. Malleable	34.00
Rails, Rerolling	37.00
Rails, Random Lengths	35.00
Rails, 18 in. and under	43.00

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$23.00-23.50
No. 1 Bundles	27.00-27.50
No. 2 Bundles	20.00-21.00
No. 1 Busheling	26.00-26.50
Machine Shop Tunrings	16.50-17.00
Mixed Borings, Turnings	16.50-17.00
Short Shovel Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Punchings & Plate Scrap	27.00-27.50

Cast Iron Grades

No. 1 Cupola Cast	33.00-34.00
Heavy Breakable Cast	29.00-30.00
Clean Auto Cast	39.00-40.00

BUFFALO

No. 1 Heavy Melt. Steel	$29.50-30.00
No. 2 Heavy Melt. Steel	27.50-28.00
No. 1 Bushelings	27.50-28.00
No. 1 Bundles	28.50-29.00
No. 2 Bundles	26.00-26.50
Machine Shop Turnings	18.00-18.50
Mixed Borings, Turnings	19.00-19.50
Cast Iron Borings	19.00-19.50
Short Shovelings	19.50-20.00
Low Phos.	30.50-31.00

Cast Iron Grades

No. 1 Machinery	*37.00-38.00*
No. 1 Cupola	32.50-33.50
Stove Plate	31.50-32.50
Malleable	32.50-33.00

Railroad Scrap

Rails, 2 ft. and under	38.00-39.00
Scrap rails	35.00-35.50
Specialties	33.00-34.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$22.00-23.00
No. 2 Heavy Melt. Steel	18.50
No. 1 Busheling	18.50-19.00
No. 1 Bundles	22.00-23.00
No. 2 Bundles	16.00-16.50
Machine Shop Turnings	13.00-13.50
Mixed Borings, Turnings	13.00-13.50
Short Shovel Turnings	14.00-14.50
Punchings & Plate Scrap	23.50-24.00
Low Phos. Plate, 5 ft & under	23.50-24.00
Elec. Furnace Bundles	21.50-22.00

Cast Iron Grades

No. 1 Cupola Cast	26.00-26.50
No. 1 Machinery	27.00-28.00
Charging Box Cast	27.00-28.00
Heavy Breakable	27.00-28.00
Unstripped Motor Blocks	20.00
Malleable	*35.00*

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	*$21.00-21.50*
No. 2 Heavy Melt. Steel	17.50-18.00
No. 1 Bundles	*21.00-21.50*
No. 1 Busheling	*20.00-20.50*
Machine Shop Turnings	*12.50-13.00*
Mixed Borings, Turnings	*12.50-13.00*
Short Shovel Turnings	*14.00-14.50*
Bar Crops and Plate	21.00-22.00
Punchings & Plate Scrap	21.00-22.00
Chemical Borings	19.00-19.50

Cast Iron Grades

No. 1 Cupola Cast	27.50-30.50
Mixed Cast	*22.50-23.00*
Heavy Breakable Cast	24.50-25.50
Stove Plate	21.50-22.50
Unstripped Motor Blocks	17.50-18.50

CHICAGO

No. 1 Heavy Melt. Steel	$29.00
No. 2 Heavy Melt. Steel	27.00
No. 1 Bundles	28.00
No. 2 Bundles	25.00
Machine Shop Turnings	*19.00-20.00*
Mixed Borings, Turnings	20.50-21.00
Short Shovel Turnings	21.00
Cast Iron Borings	20.00-21.00
Low Phos.	*32.00-33.00*
Elec. Furnace Bundles	29.00-30.00
Heavy Turnings	23.00-24.00
Cut Structurals	30.00-30.50

Cast Iron Grades

No. 1 Cupola Cast	40.50-41.50
Clean Auto Cast	42.00-43.00
No. 1 Wheels	36.00-37.00
Stove Plate	32.50-33.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	*30.50-31.50*
Malleable	42.00-43.00
Rails, Rerolling	46.00-47.00
Rails, Random Lengths	36.00-37.00
Rails, 2 ft and under	41.00-42.00
Rails, 18 in. and under	42.00-43.00
Railroad Specialties	*33.00-34.00*
Angles, Splice Bars	38.00-39.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$24.00
No. 2 Heavy Melt. Steel	22.00
No. 1 Busheling	22.00
No. 2 Bundles	20.00
Machine Shop Turnings	19.50
Mixed Borings, Turnings	17.00
Short Shovel Turnings	23.00
Cast Iron Borings	19.00
Bar Crops and Plate	27.00-28.00
Cut Structurals	27.00-28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00
Stove Plate	30.00
No. 1 Wheels	30.50-31.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	25.00-26.00
R.R. Malleable	nominal
Rails, Rerolling	33.00-35.00
Rails, 3 ft and under	nominal
Angles and Splice Bars	nominal

ST. LOUIS

No. 1 Heavy Melt. Steel	*$30.00-31.00*
No. 2 Heavy Melt. Steel	24.50-25.50
Machine Shop Turnings	*15.00-16.00*
Short Shovel Turnings	18.00-19.00

Cast Iron Grades

No. 1 Cupola Cast	*37.00-39.00*
Charging Box Cast	32.00-33.00
Heavy Breakable Cast	*31.00-32.00*
Brake Shoes	*31.00-32.00*
Clean Auto Cast	36.00-38.00
Burnt Cast	29.00-30.00

Railroad Scrap

R.R. Malleable	33.00-34.00
Rails, Rerolling	*43.00-45.00*
Rails, Random Lengths	33.00-34.00
Rails, 3 ft and under	*38.00-39.00*
Uncut Tires	*29.00-30.00*
Angles, Splice Bars	35.00-36.00
Railroad Specialties	31.00-32.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	13.00
Machine Shop Turnings	9.00

Cast Iron Grades

No. 1 Cupola Cast	30.00-35.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Random Lengths	20.00

SEATTLE

No. 1 Heavy Melt. Steel	$18.00
No. 2 Heavy Melt. Steel	18.00
No. 1 Busheling	15.50
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	13.00
Mixed Borings, Turnings	13.00
Punchings & Plate Scrap	27.50
Cut Structurals	27.50

Cast Iron Grades

No. 1 Cupola Cast	25.00-30.00
Heavy Breakable Cast	25.00
Stove Plate	25.00
Unstripped Motor Blocks	18.00
Malleable	25.00
Brake Shoes	20.00
Clean Auto Cast	27.50
No. 1 Wheels	27.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	19.00
Railroad Malleable	25.00
Rails, Random Lengths	19.00
Angles and Splice Bars	19.00

LOS ANGELES

(F.o.b. car, Los Angeles)

No. 1 Heavy Melt. Steel	$20.00
No. 2 Heavy Melt. Steel	18.00
Nos. 1 & 2 Bundles	16.00
No. 3 Bundles	nom.
Machine Shop Turnings	5.00
Mixed Borings, Turnings	5.00
Punchings & Plate Scrap	26.00

Cast Iron Grades

No. 1 Cupola Cast	34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	20.00
Rails, Rerolling	30.00

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$24.00
No. 1 Bundles	24.00
Mechanical Bundles	22.00
Mixed Steel Scrap	20.00
Mixed Borings, Turnings	18.00
Rails, Remelting	24.00
Rails, Rerolling	27.00
Busheling	18.50
Bushelings new factory, prep'd	22.00
Bushelings new factory, unprep'd	17.00
Short Steel Turnings	18.00

Cast Iron Grades

Cast	40.00-43.00*

* F.o.b. shipping point.

A simple STOCK answer to your drive problems

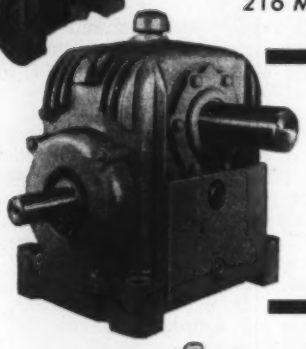
...available from stock at an amazingly low cost per horsepower

444 standardized gear sets
Over 190,000 standardized reducers
Only 58 standardized mountings

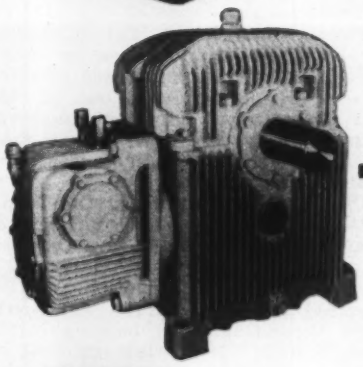
The double-enveloping principle of Cone-Drive Gears also gives you higher load capacity, longer life, less weight, greater compactness.

All parts for a given center distance—gears, mountings, bearings, housings, fan-cooling attachments and water cooling coils (for continuous, high-load operation), etc.—are standardized whether you use pinion over or under, gear shaft vertical or horizontal, single or double extended shafts, right or left hand.

192 Models; 8 Ratios (5/1 to 50/1); 2″ Center Distance	**.06 to 3 hp**
192 Models; 8 Ratios (5/1 to 50/1); 2½″ Center Distance	**.1 to 5½ hp**
216 Models; 9 Ratios (5/1 to 60/1); 3″ Center Distance	**.17 to 9 hp**

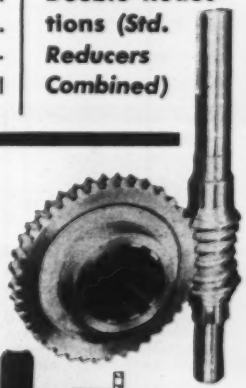


2539 Models (1421 of these may also be fan or water-cooled) 9 Ratios (5/1 to 60/1) in 4″ Center Distance 10 Ratios (5/1 to 70/1) each in 5″ to 12″ Center Distances 8 Ratios (10/1 to 60/1) in 15″ Center Distance 9 Ratios (8/1 to 60/1) in 18″ Center Distance	**2 to 636 hp @ 1150 rpm (HP at higher and lower input speeds approximately in proportion)**

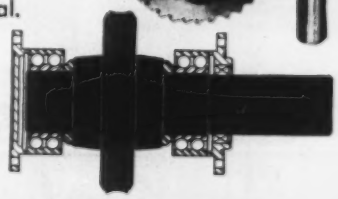


Ratios up to 4900/1 (186,250 reducer combinations) Max. Output Torque 4,000 to 244,600 in.-lbs. Input—½ to 68 hp. Water cooling available for either or both primary and secondary units. 2½″ and 3″ center distance primaries are special

Double-Reductions *(Std. Reducers Combined)*



STANDARDIZED GEAR SETS FROM STOCK—A size and ratio to fit most needs. .06 to 636 hp. 7 to 10 ratios in each size (5/1 to 70/1). Remarkably compact. Available with standardized interchangeable mountings with anti-friction bearings. Single or double extended pinion or gear shafts, pinion over or under, gear shaft vertical or horizontal.



Complete specifications and prices on request. Please give approximate hp range, input speeds, ratio and approximate quantities which would be required.

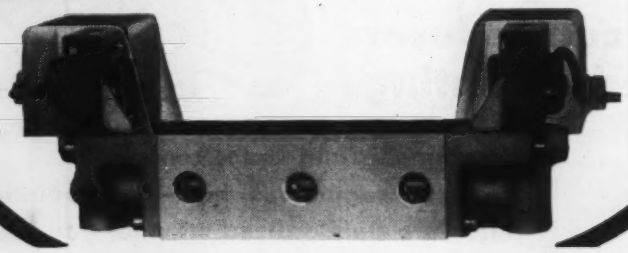
CONE-DRIVE GEARS
Division, Michigan Tool Company

DOUBLE ENVELOPING GEAR SETS & SPEED REDUCERS

7171 E. McNichols Road • Detroit 12, U.S.A.

another NEW Quick-As-Wink development

Type "DS" double solenoid pilot operated single plunger control valve



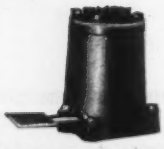
▶ smaller, shorter stroke solenoids — lower amperage
▶ simpler electrical controls — high air economy...

● Small solenoids traveling through only a 1/8" stroke move small pilot valve plungers to apply air to operating pistons that move the main valve plunger back and forth. All operating parts are rugged, yet weigh only a few ounces. Reduced amperage eliminates intermediate relays, simplifying control circuits. Positive high cycle operation, without destructive impact, reduces maintenance and minimizes trouble due to voltage variations. 3/8" to 2" sizes. 2, 3, and 4-way actions. Solenoid control both directions or automatic return in one direction.

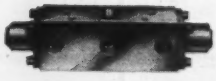
Send for Data Sheet No. 1611. It gives full details.

Individual DATA SHEETS for Each Valve — give complete details. Write today!

Hand Operated Air Valves—wide variety of uses. 2-way, 3-way, 4-way neutral position and compound exhaust.

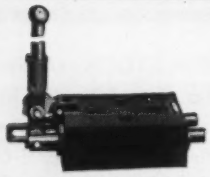


Foot Operated Air Valves—workman has both hands free, speeding production. 2-way, 3-way and 4-way actions.

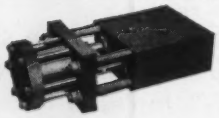


Single Plunger Valves—for air or low pressure hydraulic service. Lever, pilot, cam, diaphragm or solenoid operated. 2-way, 3-way, 4-way actions.

Series "O" and "OE" Valves—for air or hydraulic service up to 125 PSI. Push-pull, cam, pilot, diaphragm and solenoid operated. 1/8" and 1/4" pipe connections. 2-way, 3-way, 4-way and 5-way actions.



Hydraulic Valves—Up to 5000 PSI. Conservatively rated. 1/2", 3/4", 1" and 1 1/2" sizes. 2-way, 3-way, 4-way actions.



Hydraulic Valves—Up to 5000 PSI. Pilot cylinder operated. 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", 3" and 4" sizes. 2-way, 3-way, 4-way actions.

Quick-As-Wink Control Valves

THE HIGHER THE PRESSURE • THE TIGHTER THE SEAL

Manufactured by C. B. HUNT & SON, Inc.

1922 East Pershing Street, Salem, Ohio

Sheets Strip . . .

Sheet and Strip Prices, Page 117 & 118

Pittsburgh—Hot-rolled strip sellers are expected to adopt Inland Steel Co.'s extra revisions establishing flat charge of 25 cents per 100 pounds for exclusion of short lengths when cut lengths over 120 in. are specified. Orders which do not permit shipment up to 10 per cent shorts currently are subject to additional charge of 10 per cent. This action will affect but a small portion of customers' requirements. Cold-rolled strip interests may also follow this pricing pattern. Adoption also is indicated of footnote under mill edge size extra table in Inland's revised card to effect widths must be specified in increments on not less than 1/32-inch. Mills thus will not have to hold widths to such close tolerances as frequently specified.

Most sellers anticipate full production schedules well into third quarter. Heavy demand persists for silicon, enameling and galvanized sheets.

Near record consumption of tin plate adversely affects product mix in relation to sheet and strip supply; similarly heavy cold-rolled sheet demand is restricting supply of plain hot-rolled material.

Nonintegrated cold-rolled strip interests' mill allotments range between 70 to 80 per cent of requirements.

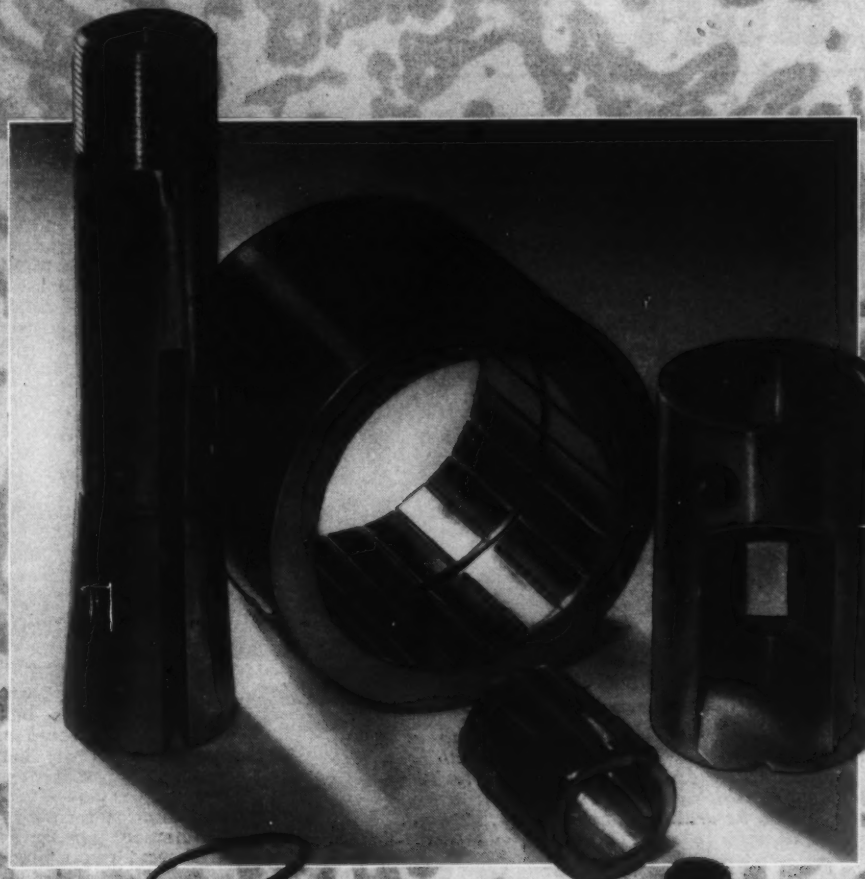
New York—Local sellers say there may be a narrowing in the gap between supply and demand but that excess inquiry is still pronounced. Deliveries on stainless extend 11 to 12 weeks.

Boston—Revised railroad rates on 80,000 pound shipments of steel, effective May 1, are not applicable from New England strip producing points; new rates to meet truck competition will be provided to extent needed. Pressure for flat-rolled steel in practically all categories is unabated; in case of hot-rolled carbon sheets it is intensified by sharp reduction of tonnage by one Buffalo producer.

Philadelphia—Light, flat-rolled order backlogs would be heavier were it not for limitations imposed by producers. Some mills are out of the market entirely. Some sheetmakers estimate they will have only a few weeks' production available for new business in third quarter.

Cleveland—Pressure for the light, flat-rolled products shows no sign of abatement. Producers are booked well into the summer. A large part of third quarter production will be required to care for the carryover from second quarter, barring order cancellations. Meanwhile, interest in conversion steel is growing. Revival of gray market offerings on a large scale is not reported here. Substantial offerings of foreign steel, including sheets, are attracting interest of buyers in this area who are pinched for supplies. Tonnage direct from Europe is reported scheduled to arrive at Cleveland dock beginning after mid-April. Importers are offering lake port delivery thoughout the summer at "competitive" prices.

Chicago—Numerous sheet consumers, including farm implement, home appliance, furnace and construction equipment makers, complain the steel



Sleeve bearings are not damaged by microscopic particles in the air or the lubricant. Bunting Bearings should be handled with care and cleanliness, but do not require the observance of surgical standards for their successful use. Bunting Engineers are prepared to assist in designing new installations. The Bunting Brass & Bronze Company, Toledo 9, Ohio. Branches in Principal Cities.

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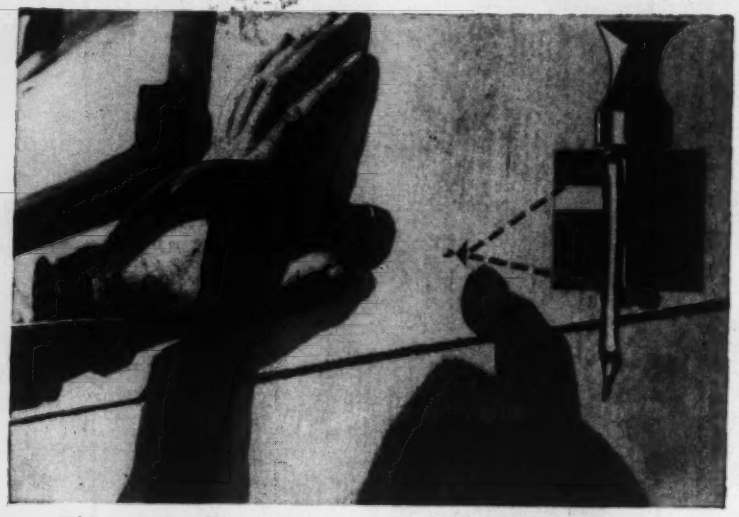
BRONZE BEARINGS ☆ BUSHINGS ☆ PRECISION BRONZE BARS

60

ES Trade Mark nail*

the amazing new self-locking fastener



This picture illustrates how the self-clinching face nail attaches asbestos shingles to gypsum and insulation sheathing. Inset shows, in cross section, the self-clinching principle. The fastener head is flattened, which in turn, by automatic action, causes the locking foot to be drawn up behind the sheathing.

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ELASTIC STOP NUT CORPORATION OF AMERICA

MADE OF MicroRold® STAINLESS STEEL STRIP

Production of these stainless steel nails exceeds 600,000 per day — enough to take care of 250 houses.

MicroRold Stainless Steel Strip, cold reduced on the Sendzimir Mill, was selected for material because of its many advantages, which are not obtained by conventional rolling methods. These include accuracy of gauge and dimensions, excellency of surface conditions, reduced die wear, less rejects, and many others.

The economies of using Micro-Rold have been proved and new case histories are being developed every day. Let your distributor give you full details and demonstrate how it can save you money.

**Reg. Trade Mark of Elastic Stop Nut Corporation of America.*

WASHINGTON STEEL CORP.
120 WOODLAND AVENUE
WASHINGTON, PA.

shortage is the only stumbling block to increased production. Urgent need for immediate delivery is causing a spurt in deals for conversion tonnage and a resurgence of activity in the gray market. Mills are unable to make commitments for second quarter delivery and some are booked through July. One converter offers late May position for hot-rolled sheets if semifinished material is supplied.

Birmingham—Producers are heavily booked on virtually all light, flat-rolled steel products. Consumers are trying to get on third quarter books but the local producer is booking only for current quarter.

Los Angeles — Demand for sheet and strip continues heavy as consumer pressure mounts. Local producers are falling behind on deliveries. Shipments from eastern sources are lagging; one order placed in January for August delivery has been postponed indefinitely. Some eastern-produced sheet continues to trickle through on allocation, but tonnages are small and deliveries uncertain. Kaiser Steel Corp.'s new 86 in. hot strip mill is still in experimental use only.

San Francisco—Sheet demand is stronger. Overall supplies are dwindling. Scarcely any flat-rolled tonnage is coming from eastern mills.

Wire . . .

Wire Prices, Page 119

Boston—Some third quarter volume in specialties is being booked, but there are scattered openings for second quarter on some low carbon grades. Pressure from the automobile industry is strong, exception being some deferments from Chrysler. Mechanical spring requirements are brisk and razor blade buying is fair. Some Swedish rods in music wire grades are being processed.

Birmingham — Improved weather conditions have renewed pressure for most wire items. Mills are hard pressed on fencing and barbed wire. Need for baling wire has tapered.

Steel Bars . . .

Bar Prices, Page 117

Boston—While hot-rolled carbon bar deliveries are more extended consumers generally are covered through second quarter. Users of high-carbon flats and small rounds, including file manufacturers, are carrying fair inventories, but most consumers' stocks are not sufficient to warrant inventory reduction. Demand for all grades of bars is more diversified, but alloys are inclined to lag.

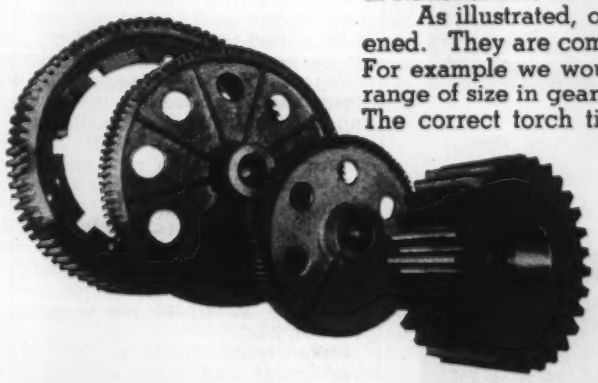
Pittsburgh—Cold-finished bar demand from automotive and appliance interests shows no signs of diminishing. Barring strike at General Motors' plants, automotive requirements are expected to record little change until model changeover. Most cold finishers are operating 85 to 90 per cent of capacity. Cold-finished deliveries are promised for late July and early August; open-hearth alloys into June.

Philadelphia—Hot carbon bar sellers are sold up for this quarter, except for openings on certain sizes. Mills are accepting specifications from regular customers for shipment

The right TORCH TIP to fit the Gear Tooth Size . . . The Secret of NE Uniformity in Flame Hardening

In the Flame Hardening heat treatment of Neloy or Neloy Moly Alloy Steel gears for the machines of industry, the right torch tip to fit the tooth size is of prime importance. Penetration of hardness to the proper depth for a given size of gear tooth, and core toughness can be obtained uniformly in no other way. Directing the flame to the teeth from a torch tip that fits the tooth size is assured at National-Erie . . . It is a standard "Must" that is never overlooked.

As illustrated, our torch tips are developed to fit the tooth size to be hardened. They are comparable in sizes to the standard range gear cutters or hobs. For example we would use the same tip for a 1 D.P. and 3" C.P. tooth. Each range of size in gear teeth requires a torch tip that fits the tooth to be hardened. The correct torch tip plus National-Erie skill in flame hardening assures the combination of a high surface hardness comparable to the carburizing or case hardened treatment, with a core toughness of a fully quenched medium carbon alloy steel.



A range of torch tips has also been developed by our engineers with the same care, for the flame hardening of track wheel treads and rope sheave grooves. They also are illustrated. Full details are yours in Bulletin No. 9. Write for it.

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If you are in the market for high performance steel tubing it will more than pay you to check with Brainard — one of America's leading producers of electric welded mechanical tubing.

Brainard tubing is available in either the round or square, in sizes from ½" O.D. to 4-inch O.D. inclusive. Wall thicknesses of from .025 to .165.

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Company _____
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SHARONSTEEL
TUBING DIVISION
BRAINARD STEEL COMPANY
2314 LARCHMONT AVE., WARREN, OHIO

in July. Cold drawers are booking into third quarter. Deliveries on hot and cold drawn alloy bars average 8 to 10 weeks.

New York—Bar business is brisk and diversified. Some producers are virtually sold out for this quarter, although June shipment is still not too difficult.

Cleveland — Merchant bar shipments extend through second quarter and in some sizes into third quarter. Demand is noticeably heavier from some directions and indications are the mills will enter third quarter with substantial arrearages. Cold-drawers and forge shops have been meeting with difficulty in filling all their requirements.

Chicago—Bookings of hot carbon bars by some producers extend beyond second quarter. Bars run second only to flat-rolled material in tightness. Third quarter quotas are being prepared by one interest, the carryover now amounting to all of July's expected output. Vacations at merchant mills are being planned to prevent any curtailment in overall production. Demand for reinforcing bars is less active and fabricators are reasonably well stocked.

Los Angeles — Bar demand has lightened slightly, but continues steady in the popular bar sizes. Most producers are running current with demand, with deliveries ranging 4 to 8 weeks.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 117

Los Angeles—Oregon mills are now in the local reinforcing bar market, offering at competitive prices and absorbing the freight. Local fabricators, locking horns with the Northern invaders, say they are being under-bid.

Seattle—Rolling mill operations are steady. Large volume of proposed projects, most less than 100 tons of reinforcing, are pending. This quarter's output will be materially larger than that in first quarter.

Structural Shapes . . .

Structural Shape Prices, Page 117

Pittsburgh—Distribution of structural shapes is expected momentarily to be placed under an allotment basis by Carnegie-Illinois Steel Corp., excluding standard shapes at Homestead plant. Fabricators report slight improvement in order backlogs, but keen competition in form of price cutting continues on new work.

Boston—Volume of structural steel business is maintained by public work, mostly bridges. Bulk of bridge work requires relatively light shop fabrication and is highly competitive; this maintains pressure on prices which are 35 to 40 per cent below postwar highs.

Philadelphia—Backlogs at structural shops and shape mills are expanding. Tonnage is confined principally to public work.

Cleveland—Fair number of small jobs is before the market. While the bulk of current demand is for public projects, a surprisingly large number of private undertakings is shaping up in the form of apartments, plant additions, garages and auto showrooms. Small tonnage is

involved in the separate jobs, but overall tonnage is substantial. Price shading on fabricated work continues. Some fabricators are inclined to hold off bidding until such time as price-cutters have become booked up. Proposed reduction in rail freight rates is especially encouraging to fabricators. This will mean a cut of $3 to $4 per ton in the cost of steel delivered them from the mills. Relatively little structural tonnage is shipped by truck.

Chicago — Avidness with which some fabricators, who have substantial order backlogs, continue to seek new contracts is puzzling. One such fabricator has taken a sizable job by bidding far lower than was considered reasonable. Fear apparently is strong that present volume of business will not last. Wide flange beams are the only item in abnormally tight supply.

Birmingham—Widely scattered demand for miscellaneous shapes adds up to considerable tonnage in the aggregate. Bridge work and an assortment of public building accounts for the major part of demand.

San Francisco—Some pickup in private building plus heavy public works construction stimulated the outlook for structural steel business.

Seattle—Fabricators have backlogs to end of the quarter. Inquiry is active for small tonnages, while several sizable projects are on the boards.

Tin Plate . . .

Tin Plate Prices, Page 118

Philadelphia — Consumers are switching from hot dip plate to electrolytic too rapidly for producers to handle. Hence, various mills find themselves greatly oversold on electrolytic. Unless important crop failures are experienced tin plate producers generally see high production throughout third quarter.

Imports . . .

Cleveland—Foreign steel is being offered in the Cleveland area by importers who promise delivery within four weeks after receipt of order. Shipment from Hamburg and Bremen to Cleveland dock at "competitive" prices is quoted. Products offered include plates, shapes, beams, reinforcing bars, sheets and tubing. First shipment by vessel to Cleveland is expected after mid-April. Cargoes are promised monthly until late in the summer.

Stainless Steel . . .

Stainless Steel Prices, Page 120

Pittsburgh—Prior to recent decision to place stainless strip distribution on quota basis, most sellers were booked into late July and August. Unbalanced demand-supply situation in stainless sheets also is reaching point where quota distribution soon is indicated. One interest reports improvement in demand for stainless wire items, with first-quarter output establishing a new record. Deliveries on other stainless products remain within normal processing time.

Widening applications for stainless is noted for such end-uses as windows and spandrals for office buildings and conveyor belt installations.

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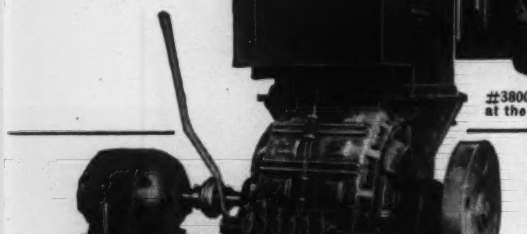

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Semifinished Steel . . .

Semifinished Prices, Page 116

Chicago—Shortage of semifinished material, hot bands, sheet bars and other items, is more pronounced. Some nonintegrated mills report premium priced material has been their salvation. Even so, one mill is periodically forced into a few days' idleness until stocks are built up.

Plates . . .

Plate Prices, Page 117

New York—Plate specifications are more active, especially from light tank fabricators and railroad car shops.

Domestic shipyards recently lost four 18,000 deadweight ton oil tankers for Stavros S. Niarchos, New York and Piraeus, to Vickers-Armstrongs Ltd., New Castle-on-Tyne shipyard. These are in addition to two 31,000-ton tankers recently placed by Stavros S. Nicharos, with the same company's Barrow yard.

Boston—Deliveries are more extended due to heavier requirements for freight cars and large diameter pipe lines, but lengthening is not enough to stimulate buying beyond nearby needs. Small tank and miscellaneous commitments are up slightly. Mild improvement is recorded for paper mill and chemical plant requirements, involving specialties in some cases. Service station gasoline fueling systems at Boston, Framingham, Wakefield and Falmouth, Mass., will be installed by U.S. Property & Disbursing Office for Massachusetts.

Pittsburgh—Carnegie-Illinois Steel Corp. has placed plate distribution under allotment due to extended mill deliveries resulting from a sharp upturn in demand. Considerable tonnage has been placed with eastern producers. Plate rolling schedules to fill commitments for transmission pipe lines continue major consumer outlet, although tank fabricators and other interests have re-entered the market due to rapidly expanding mill backlogs. There appears little prospect of freight car builders readily obtaining necessary supply of plates, shapes and other steel products should Equitable Life plan for purchasing freight cars rejuvenate car purchases.

Philadelphia—Plate demand is increasing, especially tonnage for fabrication into light tanks, railroad cars and for car repairs. Requirements from builders of agricultural and road building equipment also are a factor and more tonnage is coming out from electrical equipment manufacturers. Shipment promises range from 4 to 12 weeks. Lukens Steel Co. resumes operations at its 206-in. mill Apr. 17. This has been down since late January for electrification.

Chicago—Mills anticipate a progressive worsening in plate supply here, the pickup in freight car ordering coming on top of pipemakers' unrelenting pressure. Only floor plate is readily available. Resistance to premium priced material is encountered from some users, particularly pipe line operators, although high freight costs are inevitable for district users who want prompt delivery of more steel than is on quota . A few eastern mills are still soliciting

orders. Shortage of barge capacity is reported by some consumers who had been receiving material in this manner. A $37 million tank construction program over the next three years is planned by Great Lakes Pipe Line Co.

Birmingham — Pressure for plates continues. Pipeline work accounts for a large proportion of one mill's production. Carbuilding is next biggest user.

Los Angeles — Increasing pipeline and tank requirements are stiffening plate demand, especially in ¼ in. and 3/16 in. gages. Casings being replaced in Los Angeles Harbor are taking quantities of ⅜ in. plate. Kaiser Steel Corp.'s Fontana mill plate books are still open for June.

San Francisco—Heavy gage plates are being channeled to pipe mills for large diameter natural gas pipelines. Demand for thinner gages is only fair.

Seattle—Plate fabricators report fair run of small jobs. No important tonnages are pending.

Tool Steel . . .

Tool Steel Prices, Page 119

Pittsburgh—Moderate improvement in demand for tool steels continues. Producers are operating 70 to 80 per cent of capacity compared with 50 to 60 per cent most of last year. Bulk of tool steel items are available from stock. Consumers' and distributors stocks are considered normal.

Fasteners . . .

Bolt, Nut, Rivet Prices, Page 120

Pittsburgh—Slight improvement is noted in demand for fasteners. Producers are operating most departments on five-day week basis. Standard items are readily obtained from stock with specialties available in normal processing time. Tightening in mill supply of wire rods has developed, although this situation has not yet adversely affected production schedules among nut and bolt producers.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 120

Pittsburgh — Weakness in coal prices outside this district has not yet spread here nor created much pressure for lower coke quotations. Beehive foundry coke demand remains depressed and there is relatively good activity in oven foundry grades. Shipments of oven foundry or furnace coke to this district have declined sharply since termination of the coal strike. Some buying of beehive furnace coke by integrated mills is still noted. Jones & Laughlin Steel Corp. will spend $4 million for 59 additional Koppers by-product coke ovens at its Aliquippa works.

Cleveland — Oven-coke suppliers have not yet caught up with back orders resulting from the coal strike. Some foundries are receiving only about half their April requirements. It is expected this condition will prevail until May by which time production and shipments will be back to normal. Easing in coal prices appears to have soft-pedaled talk of higher coke prices.

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—Ben Franklin's Almanac, 1757

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—Acme Steel's Notebook, 1950

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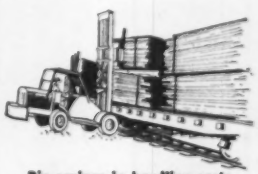

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Refractories . . .

Refractories Prices, Page 121

Pittsburgh—Demand for refractories has leveled off. Considerable work is involved in replacing brick in by-product ovens at Carnegie's Clairton Works. Contracts have been awarded on two batteries of 87 ovens each. Two additional batteries are scheduled for relining later this year. The 59 new coke ovens for Jones & Laughlin's Aliquippa Works is another favorable market factor. Demand from foundries and tool steel electric furnace operators is depressed. Producers are quoting $33 per net ton for domestic dead-burned magnesite in bulk, $38 in single paper bags; advances of $2.50 and $3, respectively.

Pig Iron . . .

Pig Iron Prices, Page 116

Cleveland—More active demand for castings is stimulating merchant iron specifications and some new buying. Some foundries that had been on a 3-day week have gone to 5-days. April is proving a much more active month than March when industry was beginning to get back into the swing after the coal strike. Those foundries that had cut inventories are replenishing stocks. Iron supply is adequate for current needs but there is no excess tonnage. Builders of machine tools, heavy machinery and farm implements are reported ordering castings actively. In fact, foundry backlogs are said to be sufficient to support heavy melting schedules into summer. Speculation is encountered in the local pig iron market with respect to requirements for the new Ford foundry being built here. It is assumed only part of this plant's needs will be supplied by Ford's own furnaces.

Pittsburgh—Captive foundries are maintaining a substantially higher production pace than jobbing interests and, consequently, are absorbing bulk of merchant foundry iron produced. Most jobbing shops are operating 3 to 4 days per week. Output of foundry iron is in close balance with consumption. Pittsburgh Steel Co. is expected to bring its idle blast furnace into service this month. This unit has been idle since purchase of the 1200-ton DPC furnace.

New York—Foundries report improved demand for castings. They are buying more pig iron.

Boston — Mild improvement in foundry operations is reflected in slightly heavier pig iron shipments. Most smaller shops are operating at higher levels, but in some cases are shading prices on finished castings.

Philadelphia — Pig iron requirements are gaining. Consumers have a better range of grades to draw on. Demand for iron castings is the best this year.

Washington—Malleable iron castings shipments in February totaled 60,000 net tons compared with 63,000 in January and 67,000 in February, 1949. Unfilled orders amounted to 67,000 tons at end of February, 5000 tons more than at end of January, but only half the tonnage on order at end of February, 1949.

Buffalo—Demand for merchant iron picked up appreciably last week. A number of leading melters returned to the market. Production holds at 100 per cent.

Chicago—Inland Steel Co.'s No. 4 stack, one of two still idle, is expected to be blown in about May 4. The district now has 38 units in blast. Foundry operations are much improved over a few months ago, most being on a five-day week. Pig iron is in good demand, but would be ordered more freely if greater coke supply were available.

Cincinnati—Pig iron shipments are unchanged. Few foundries are on better than a four-day schedule. Stringency in supplies of iron and coke, has passed.

Birmingham—Merchant iron production is scheduled at capacity through second quarter. No appreciable let-up in demand is expected.

Rails, Cars . . .

Track Material Prices, Page 119

New York—Domestic freight car orders last month of 6201 units were down 2874 cars from preceding month, American Railway Car Institute says. Deliveries totaled 1712 cars, against 2064 in February and 11,910 in March, 1949.

As of Apr. 1, order backlogs totaled 30,539, against 26,055 Mar. 1 and 73,129 Apr. 1, 1949.

Warehouse . . .

Warehouse Prices, Page 121

Cleveland — Order volume entertained by local warehouses is satisfactory. Improvement in manufacturing operations and opening of the building season is expected to boost April tonnage over that of March. One distributor's March volume compared favorably with the best months in its history. Mill shipments are tightening in some directions, but with the exception of the light, flat rolled products, warehouse stocks are comfortably balanced. Imported steel from Germany is being offered here for delivery at Cleveland dock beginning mid-April. A wide range of products, including sheets, is being offered at competitive prices.

Philadelphia — Warehouse demand is brisk. Some distributors report better daily average business in April than in March. Galvanized sheets are being marked up to reflect recent increase in zinc.

Chicago—Some distributors report current volume above last year's level; others are being stymied by the sheet shortage. Plates are increasingly scarce, demand on mills having picked up from several sectors, including car shops.

Cincinnati — Active demand for warehouse steel is sustained. Coal mines are in the market.

Los Angeles — Distributors' steel shipments rose 10 to 25 per cent in March over February. No immediate slackening in demand is indicated as consumers increasingly turn to warehousemen for smaller tonnages.

San Francisco — Although warehouse volume is spotty, business is improving.

Seattle—Distributors report business volume is heavier than in first quarter. Improvement is expected as seasonal work develops.

Scrap . . .

Scrap Prices, Page 124

Pittsburgh—Broker buying above price levels of last mill purchases indicates possible upturn in published quotations when mills enter the market for **May** delivery. The strong price undertone reflects advances in prices at other points which make it impossible to deliver remote No. 1 heavy melting scrap to mills here within range of $32 to $32.50.

Boston—Heavy melting is stronger, price advancing 50 cents per ton. No. 1 bundles are selling at $21-$21.50. Supply is somewhat tighter. Mixed cast is $1 per ton higher but cast grades generally are unchanged.

Philadelphia—Scrap buying is at higher levels. Business is active and the market undertone is strong. Some trade authorities look for higher prices. No. 1 heavy melting is now $26, delivered; No. 2 is $24; No. 1 busheling $25. Prices on most cast grades are higher with No. 1 cupola $33-34.

New York—Brokers' buying prices are unchanged, except for malleable which is up $1 to $35 f.o.b. shipping point. Consumer demand is steady.

Buffalo—An advance of 50 cents to $1 a ton in cast machinery features a steady to strong scrap market here. Sales were reported of top quality cast material to substantiate higher ranges while additional sales of cupola took place within the prevailing range of $32.50-$33.50.

Cleveland—Undertone of the market is strong. Nearly all interests hope for continued stability of prices. Turnings are 50 cents higher while some cast grades are 50 cents to $1 higher. Foundries are buying cautiously. Low phos for foundry use is selling around $32 compared with a top price of $30.50 for steelmaking use.

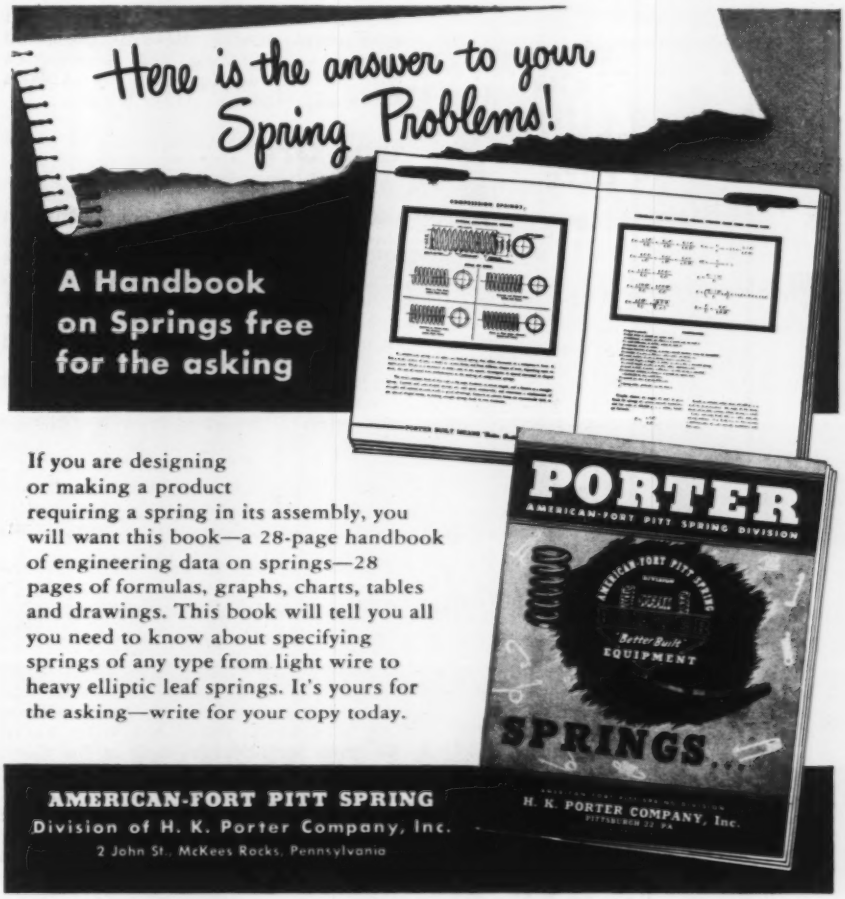
Chicago—Prices for most scrap grades are stronger but no mill purchases have been made to establish higher quotations. Brokers report considerable difficulty in covering old orders, supply of No. 2 heavy melting having dried up materially. One interest expects the present $2 spread between No. 2 steel and No. 2 bundles to widen, if aversion to bundles continues. Railroad material is stronger, No. 1 bringing $30.50-$31.50. Specialties are up $1 to $33-$34. Low phos is no longer available at the last mill buying price, now being offered at $32-$33. Machine shop turnings are now $19-$20.

Birmingham—Quickening of activity in scrap is noted. Considerable flexibility is indicated in prices with heavy melting and the better grades of cast in greatest demand.

St. Louis—Scrap market's undertone is stronger. Local transactions are small. Rising interest by foundries is contributing to activity. Offerings are light.

Los Angeles — Mills are buying slowly. Bethlehem Pacific Coast Steel Corp. is now out of the turnings market. Dealers, pessimistic over local market prospects, are eyeing foreign markets hopefully. Japan has only an eight months' supply of scrap left.

Seattle—Scrap is slightly firmer. Nos. 1 and 2 heavy melting are steady at $18. Supplies of good material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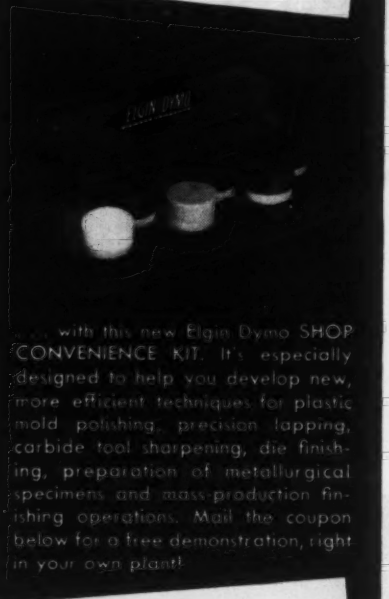

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are satisfactory. Buying is restricted to current needs. Several thousand tons of scrap rails and accessories will be offered for sale by Alaska Railroad.

Iron Ore . . .

Iron Ore Prices, Page 121

Cleveland—Bad ice conditions on the upper lakes are delaying opening of the 1950 ore shipping season. Fears are expressed tonnage movement to lower lake furnaces possibly may not get under way before May 1. By that late last year over 9 million tons had been shipped.

Consumption in April is estimated around 6,700,000 tons. This will reduce lower lake dock and furnace stocks to about 13,500,000 tons, enough for only two months' requirements. Some trading of certain grades of ore may be necessary among furnaces before ore begins coming down the lakes in volume.

Newest, fastest and largest ore carrier on the lakes, Inland Steel's *Wilfred Sykes,* will leave Lorain for its first cargo Apr. 20. It will carry limestone from Marquette, Mich., to Indiana Harbor, Ind. The ship's speed will enable it to make 44 round trips from Superior, Minn., to Indiana Harbor a season, compared with about 34 trips for other vessels in the fleet.

New York—Record 8,300,000 net tons of iron ore were imported last year, reports American Iron & Steel Institute. This was 22 per cent more than in 1948. Tonnage was received from 18 countries.

Tubular Goods . . .

Tubular Goods Prices, Page 120

Seattle—Largest cast iron pipe project in months involves 1000 tons of 16 to 4 in. pipe for replacements at the Spokane air base, bids to U. S. Engineer, Seattle, May 3.

Canada . . .

Toronto, Ont.—Production of iron and steel in Canada moved sharply upward in January. Pig iron production totaled 190,432 net tons compared with 172,002 tons in December and 183,074 tons in January, 1949. Production of steel ingots and castings in January amounted to 289,949 net tons compared with 263,949 tons in December and 284,707 tons in January, 1949.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5600 tons, Pennsylvania turnpike Allegheny river bridge, to American Bridge Co., Pittsburgh.

5000 tons, state turnpike bridge over Allegheny river, Pennsylvania, to American Bridge Co., Pittsburgh, recently noted as low bidder.

4600 tons, Belle Vernon Pennsylvania state highway bridge, to Fort Pitt Bridge Works, Pittsburgh.

3600 tons, Pennsylvania turnpike Beaver river bridge, to American Bridge Co., Pittsburgh.

2700 tons, Veterans Hospital, Cincinnati, through John A. Johnson, New York, to American Bridge Co., Pittsburgh.

1090 tons, plant building No. 2, Carrier Engineering Co., DeWitt, N. Y., to Syracuse Engineering Co., Syracuse, N. Y.

725 tons, branch store, B. Altman & Co., White Plains, N. Y., to Levine Bros. Iron Works, Yonkers, N. Y.

360 tons, state bridge, Jefferson county, New York, to Bethlehem Steel Co.

335 tons, castings paint shop, Textile Machine Works, Reading, Pa., to Reading Steel Products Co., that city.

225 tons, veterans' hospital, Boston, to Groisser & Shlager Iron Works, Somerville, Mass.; McCloskey & Co., Philadelphia, general contractor.

200 tons, miscellaneous construction projects, to Isaacson Iron Works, Seattle.

175 tons, state bridge, Albany county, New York, to the American Bridge Co., Pittsburgh.

150 tons, addition, Fulton Fish Market, South street, New York, to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

125 tons, state bridge, Bergen county, New Jersey, to Phoenix Bridge Co., Phoenixville, Pa.

120 tons, plant, American Can Co., Tampa, Fla., to Bethlehem Steel Co.

100 tons, Seneca Steel Service Inc., Buffalo, to Bethlehem Steel Co.; Siegfried Construction Co., Buffalo, general contractor.

STRUCTURAL STEEL PENDING

3500 tons, Pennsylvania turnpike bridge work, Allegheny county, over Brush creek, Plum creek, and Willow run; bids Apr. 26.

600 tons, school, District No. 1, Tonawanda, N. Y.; Siegfried Construction Co., Buffalo, general contractor.

500 tons, municipal stadium, Scranton, Pa.; bids asked.

500 tons, altitude chamber, Bureau of Yards & Docks, Trenton, N. J.; bids Apr. 18.

413 tons, state bridge work, comprising three schedules, Lackawanna county, Pennsylvania; bids May 5.

130 tons, state bridge work, Westmoreland county, Pennsylvania; bids May 5.

120 tons, factory building, American Viscose Corp., Parkersburg, W. Va.; bids Apr. 17.

120 tons, state bridge, New Castle county, Delaware; bids Apr. 26.

RAILS, CARS . . .

RAILROAD CARS PLACED

Lehigh Valley, 150 cars, 100 hoppers going to the Bethlehem Steel Co., and 50 flat cars to its own shops at Lehighton, Pa. These are in addition to 1500 cars recently noted as placed.

Reading, 1500 freight cars; 1000 fifty-ton box cars going to Bethlehem Steel Co. and 500 fifty-ton hoppers to Berwick, Pa., plant of American Car & Foundry Co., New York.

RAILS PENDING

Alaska Railroad, 45,700 tons, 115-lb rail, also about 10,000 tons accessories; bids in, award pending from Anchorage, Alaska.

PLATES . . .

PLATES PLACED

100 tons, tank, Jamaica, N. Y., to Chicago Bridge & Iron Works, Chicago.

PLATES PENDING

1895 tons, medium tensile, black grade M, type A, hull plate, various deliveries, Navy Department, inv. 2541; bids Apr. 18, Washington.

Unstated, 500,000-gal elevated steel water tank, Moses Lake, Washington, Pittsburgh-Des Moines Steel Co., Seattle, low $43,870; award pending may go concrete.

Unstated, 100,000-gal elevated steel water tank, pipeline, wells and equipment, $300,000 project; bids to Umatilla Ordnance Depot, Pendleton, Oreg., May 1.

REINFORCING BARS . . .

REINFORCING BARS PLACED

385 tons, Mendenhall apartments, Juneau, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Anderson Construction Co., general contractor.

150 tons, ferry slip, Winslow, Wash., Anchor-

age theater and Cashmere, Wash., warehouse, to Bethlehem Pacific Coast Steel Corp., Seattle.

125 tons, school building, Bridgewater, Mass., to Fabricated Steel Products Co., Boston; John Hamre & Son, Quincy, Mass., general contractor.

105 tons, military installations at Ladd Field and Anchorage, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle.

100 tons, Cable apartments, Anchorage, and Ladd Field equipment warehouse, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle.

100 tons, Montana state road projects, to Bethlehem Pacific Coast Steel Corp., Seattle; Hansen & Parr, general contractor.

REINFORCING BARS PENDING

100 tons, Washington state highway projects; bids to Olympia Apr. 25.

Unstated, 119-foot underpass and 149-foot railroad overpass, Idaho state highway projects; Charles A. Powers, Spokane, Wash., low $286,657.

Unstated, Mount States Telephone & Telegraph Co. exchange building, Caldwell, Idaho; C. B. Lauch, Boise, general contract, low $177,822.

Unstated, Washington State College women's dormatory; bids to Board of Regents, Pullman, Wash., Apr. 28.

Unstated, 10-story Oregon state office building, Portland; low base bid Ralph & Horowitz, Portland, $1,316,747.

PIPE . . .

CAST IRON PIPE PLACED

360 tons, 2700 ft fabricated water pipe, Rockaway, Department of Water Supply, Gas & Electricity, New York, to American Locomotive Co., that city.

250 tons, 6 in. centrifugal, for Ellensburg, Wash., to Pacific Water Works Supply Co., Seattle.

100 tons, 8 to 4 in., for Tumwater, Wash., to E. N. Hallgren & Co., Seattle, for American Cast Iron Pipe Co., Birmingham, Ala.

CAST IRON PIPE PENDING

1000 tons, 16 to 4 in., system replacement, Spokane, Wash., Air Base; bids to U. S. Engineer, Seattle, May 3.

55 tons, 8 and 6 in., Class 150; bids to Anita Busch, city clerk, Edmonds, Wash., Apr. 18.

STEEL PIPE PENDING

Unstated, 5480 feet 8 to 4 in., steel or alternatives, some material to be furnished by city; bids to Moses Lake, Wash., Apr. 25.

FERROALLOYS

(Continued from Page 121)

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Contract, c.l., SMxD, bulk, 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.85c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lots 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 20.50c per lb of contained chromium plus 11.30c per pound of contained silicon; 1" x down, bulk, 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max 0.50%

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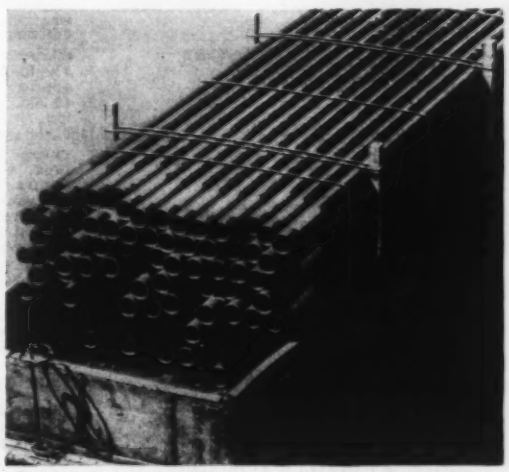

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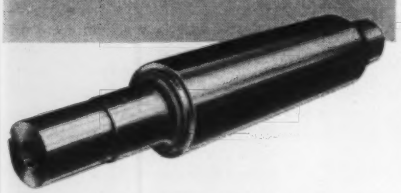

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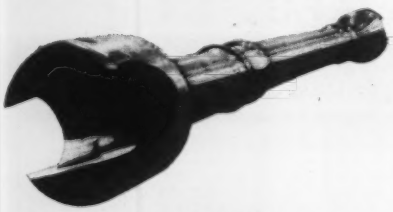

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Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 17.00c per lb of contained Si; packed 18.40c; ton lot 19.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk, 14.65-15.0c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 19.0c per lb of Si, c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 7.65c per lb of alloy, ton lots packed 9.05c, 200 to 1999 lb 9.40c, smaller lots 9.90c. Delivered. Spot up 0.5c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅜ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.45c per lb of briquet, c.l. packaged 11.25c, ton lot 12.05c, less ton 12.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.30c, per lb of briquet, c.l. packaged 11.1c, ton lot 11.9c, less ton 12.8c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.
(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size ony. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. F.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%.) Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c, less ton 22.55c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.28, less ton $1.35, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 3-4.5%.) Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-Hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.) Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.10.

Grainal: Vanadium Grainal No. 1, 93c; No. 6 83c; No. 79, 45c, freight allowed.
Vanadium Oxide: Contract, less carload lots $1.20 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

Zirconium Alloys

12-15% Zirconium Alloys: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight alowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c F.o.b. Washintgon, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $4.25 per lb contained B, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots,. 50c per lb.

Carbortam: (B 1 to 2% contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., frt allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $3.50 per lb of contained Cb, less ton $3.55. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min. C 0.30 max.) ton lots, 2" x D, $2.67 per lb of contained Cb plus Ta, delivered; less ton lots $2.72.

CMSZ Mixes: (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.50c, less ton 18.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 17.00c per lb of alloy; ton lots 18.00c; less ton lots 19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al). Lump, bulk, carload 11.00c. Ton lots, bulk 11.50c, packed 11.75c. Less ton lots, packed 12.25c per lb of alloy, f.o.b. Philo, O., with freight not to exceed railroad freight allowed to destination.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. seller's works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo., f.o.b. Langeloth and Washington, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.

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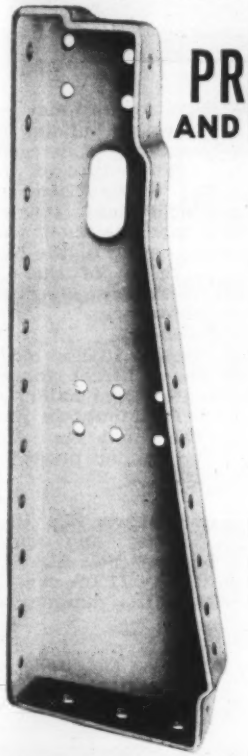

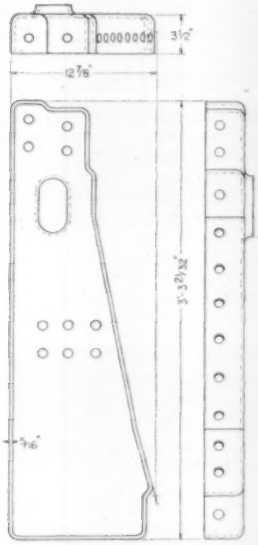

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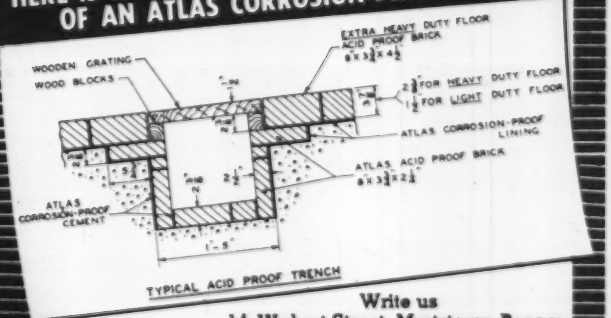
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Metalworking Briefs

CONSTRUCTION, ENTERPRISE ORGANIZATIONAL CHANGES

Alabama

Organization of **Southern Chain & Mfg. Co.,** Birmingham, is announced by James W. Dickey, vice president and general manager of the **Round Associate Chain Companies** with which Southern Chain will be affiliated. General offices and plant-warehouse of the new company will be at 1224 Second Ave. N., Birmingham. A. J. Willingham Jr. is general manager of the new company. Southern Chain will operate as an independent concern but will distribute the products of other Round associate companies which produce industrial, marine, railway, automotive, building, home and farm chain, as well as chain hoists and other material-handling equipment.

Alabama

Sloss-Sheffield Steel & Iron Co. plans to build a $300,000 office building between 33rd and 34th streets, Birmingham. Work will start May 1.

California

Stauffer Chemical Co., San Francisco, plans to build a plant for manufacture of carbon bisulphide at Lowland, Tenn. It is expected to begin operation in November. An insecticide manufacturing plant also will be built at Houston. Cost of the new factories will exceed $1.5 million.

California

Regal Amber Brewing Co. will start construction this month of a $150,000 bottling plant in San Francisco.

California

Western Steel & Wire Co. started construction of a one-story manufacturing plant in San Francisco. The building will cover 12,500 sq ft.

California

Carter Hardware Co. is constructing a new building at 1137 S. Los Angeles St., Los Angeles. Contracting Engineers are the general contractors; William Porush, structural engineer; Sam Reisbord, architect.

Colorado

Mine & Smelter Supply Co., 1422 17th St., Denver, has been appointed exclusive representative in the Denver and El Paso, Tex., area for air and hydraulic cylinders built by Hydro-Line Mfg. Co., Rockford, Ill.

Connecticut

Augur, Jones & Green, 62 LaSalle Rd., Hartford, Conn., is named representative for the state of Connecticut by **Anemostat Corp. of America,** 10 E. 39th St., New York.

Delaware

Simmons Plating Works Inc.—metal products—was chartered by the state of Delaware. Corporation Trust Co., 100 W. Tenth St., Wilmington, Del., is the principal office.

Delaware

Hunter Douglas Smelting Corp.—metals, etc.—received a charter from the state of Delaware. Capital is $20,000, and the Corporation Trust Co., Wilmington, Del., is the principal office.

Florida

International Minerals & Chemical Corp., Chicago, plans expansion program costing $4 million. Plans include: Erection of an office building as headquarters for the company's Florida phosphate operations; purchase of a site for this building just south of Bartow, Fla.; construction of a plant for manufacture of phosphate chemicals; construction of a large sulphuric acid plant; construction of modern machine shop, warehouse and service center at the Noralyn mine to serve all of the company's Florida operations; erection of an analytical laboratory.

Idaho

C. B. Lauch, Boise, Idaho, bidding $177,822, has the contract for construction of an exchange building at Caldwell, Idaho, for **Mountain States Telephone & Telegraph Co.** Plans are prepared for similar projects at Boise and Nampa.

Illinois

U. S. Engineer's Office, 826 United States Court House and Custom House, 1114 Market St., St. Louis, will receive bids May 11 for construction of the Alton, Ill., pumping station.

Illinois

Illinois Clay Products Co., Joliet, Ill., moved its Chicago office from 608 S. Dearborn St. to 208 S. LaSalle St., Chicago 4.

Illinois

Arthur S. Dudley is appointed western representative in Sacramento, Calif., by the **National Automatic Merchandising Association,** Chicago.

Iowa

Alta Co-operative Elevator Co., Alta, Iowa, awarded a contract for a grain elevator to Tillotson Construction Co., 1215 Jones St., Omaha, Nebr. Cost is about $140,000.

Kansas

International Harvester Co., 180 S. Michigan Ave., Chicago, awarded to Collins Construction Co., 15 W. Tenth St., Kansas City 6, Mo., the general contract for construction of a $2 million improvement program at its Kansas City plant.

Maryland

Southern Maryland Electric Co-operative, Prince Frederick, Md., will receive bids Apr. 25 for an office building. J. Lee Wilkinson, Leonardtown, Md., is the architect.

Missouri

Pennsylvania Railroad awarded a contract to Fruin-Colnon Contracting Co., 1706 Olive St., St. Louis, for a St. Louis freight terminal and warehouse building to be erected on Front street north of W. Broadway. Cost will be about $275,000.

Missouri

St. Louis Housing Authority, 1200 Grattan St., will receive bids until May 25 on the construction of a $7.5 million public housing project. Plans and specifications were prepared by George Hellmuth Associates, 712 Chestnut St., St. Louis 1.

Missouri

Falstaff Brewing Corp., 3617 Olive St., St. Louis, retained O. W. Stiegemeyer, architect, 452 S. Price Rd., Ladue, Mo., to prepare plans for a $1 million beer storage warehouse and general office building. Site of the building is S. Kingshighway boulevard at McRee avenue.

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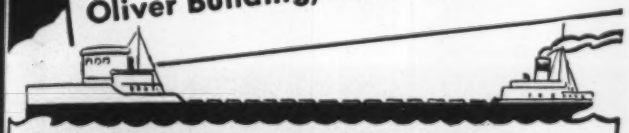

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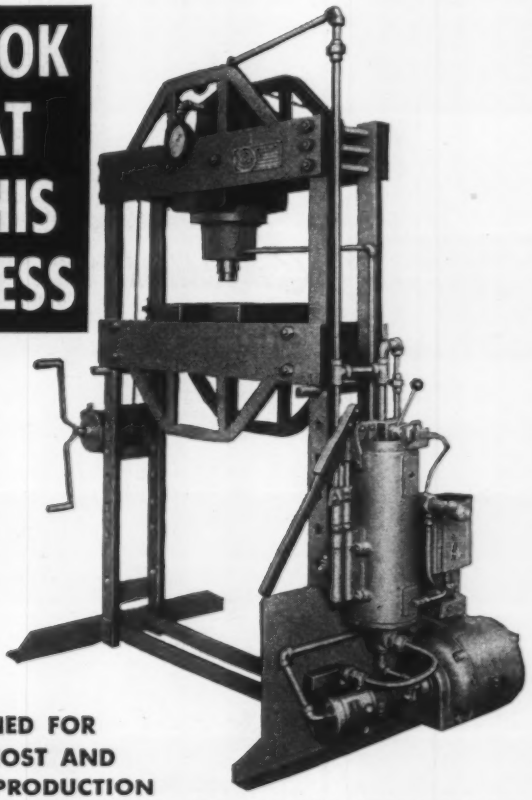

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